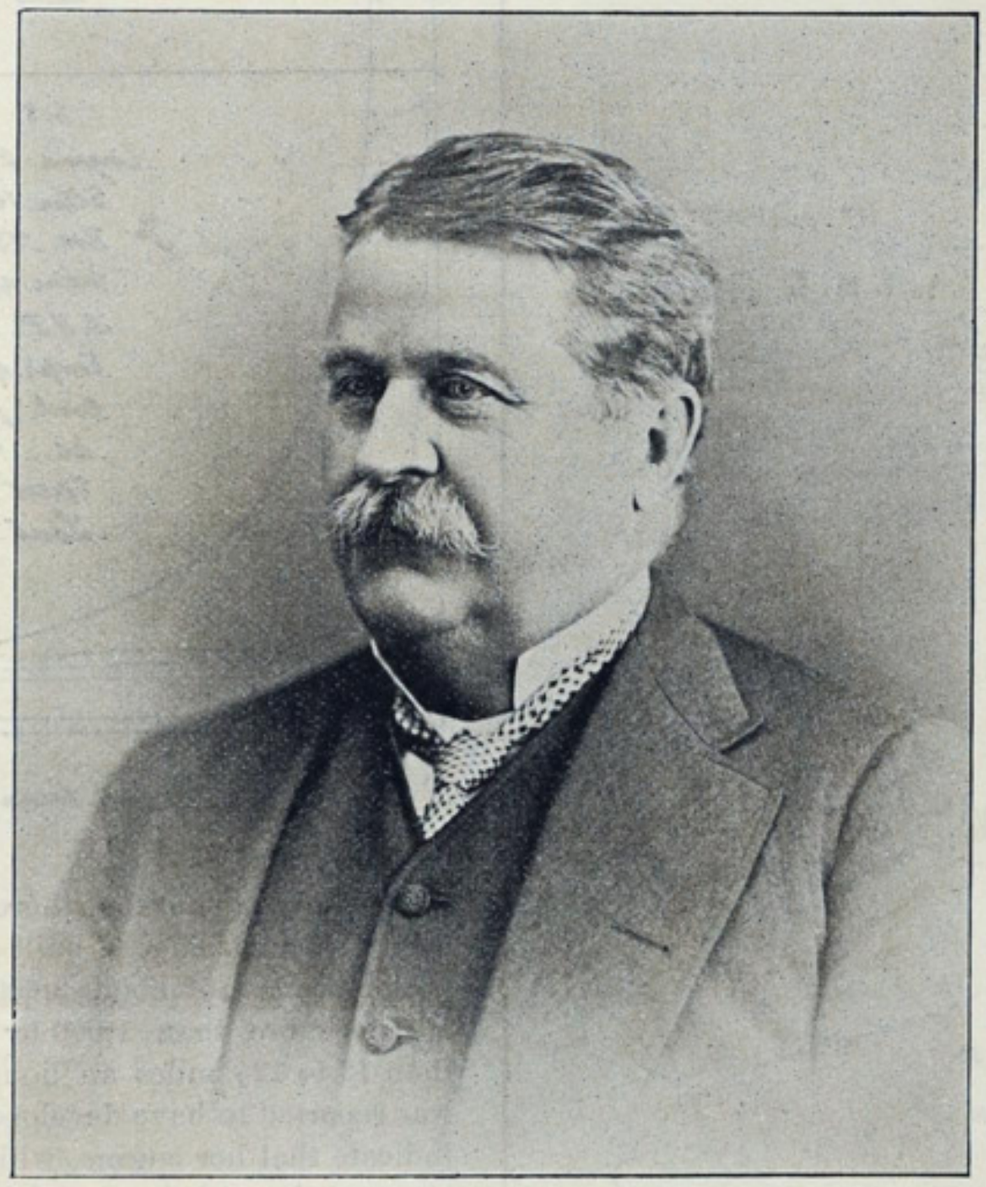
MARINE REVIEW.

VOL. XIV. CLEVELAND, O., NOVEMBER 5, 1896. No. 19.

Washington Bullard.

In the death of Washington Bullard, general manager of the Union Steamboat Co., which occurred at Buffalo on the morning of Friday, Oct. 30, 1896, the Lake Carriers' Association and the vessel interests of the lakes lose from their ranks another very prominent figure. Mr. Bullard has given almost his entire life to the service of lake transportation, and for more than a generation has been in the employ of the Erie Railroad Co. He was born in Jefferson county, New York, on the shores of Lake Ontario, and his first sailing was done on that lake. He then became a country merchant in his native county, and later drifted to Buffalo where he had a brother who was a purser on one of the boats of the old Erie line. This line ran between Toledo and Dunkirk, which was at that time the western terminus of the Erie railroad, and was managed by Mr. S. D. Caldwell, now manager of the New York Central line of steamers. Mr. Bullard became a clerk on one of the propellers of this line, and remained in this service for several years. He was then appointed agent of the line at Toledo and later, when a number of steamers were put in service between Chicago and Lake Erie, he became the Chicago agent. Buffalo finally supplanted Dunkirk as the eastern terminus of the steamboat line connected with the Erie railroad, and when Mr. Caldwell resigned his position as general manager of this line, Mr. Bullard was appointed to succeed him, with headquarters at Buffalo.

In 1872 the Union Steamboat Co., the present coporation which owns and manages the steamers connected with the Erie road, was organized, and Mr. Bullard became its general manager, and continued its faithful and active servant almost to the day of his death. For more than a year Mr. Bullard's associates and friends had seen that his physical condition was undergoing a change for the worse. On the 21st of August last he was compelled to leave his office by illness, and has never been able to return to it.



WASHINGTON BULLARD.

Mr. Bullard was a man of sterling qualities, and he had in a rare degree the power of attaching others to himself by strong bonds of affection and friendship. He was a frank and plain-spoken man, often almost blunt in his utterances. His righteous indignation at what he thought was mean or wrong was always vigorously expressed. He was quick to make up his mind on any subject and held his opinions strenuously, but no man was more fair-minded or open to conviction or change of view when good reasons could be given for it. He was as ready with his praise for good judgment and faithfulness on the part of an employee of his line as he was in condemning any lack of fidelity. Mr. Bullard was a very interesting man to the younger generation. He had a retentive memory and liked to refer to the events of the past. He was full of interesting anecdotes connected with early lake navigation. He saw great changes in the methods of transacting the business which occupied his life, but he was a man of progress himself and kept closely in touch with all improvement. He will be deeply missed in Buffalo where he was a well known and greatly respected figure in business circles.

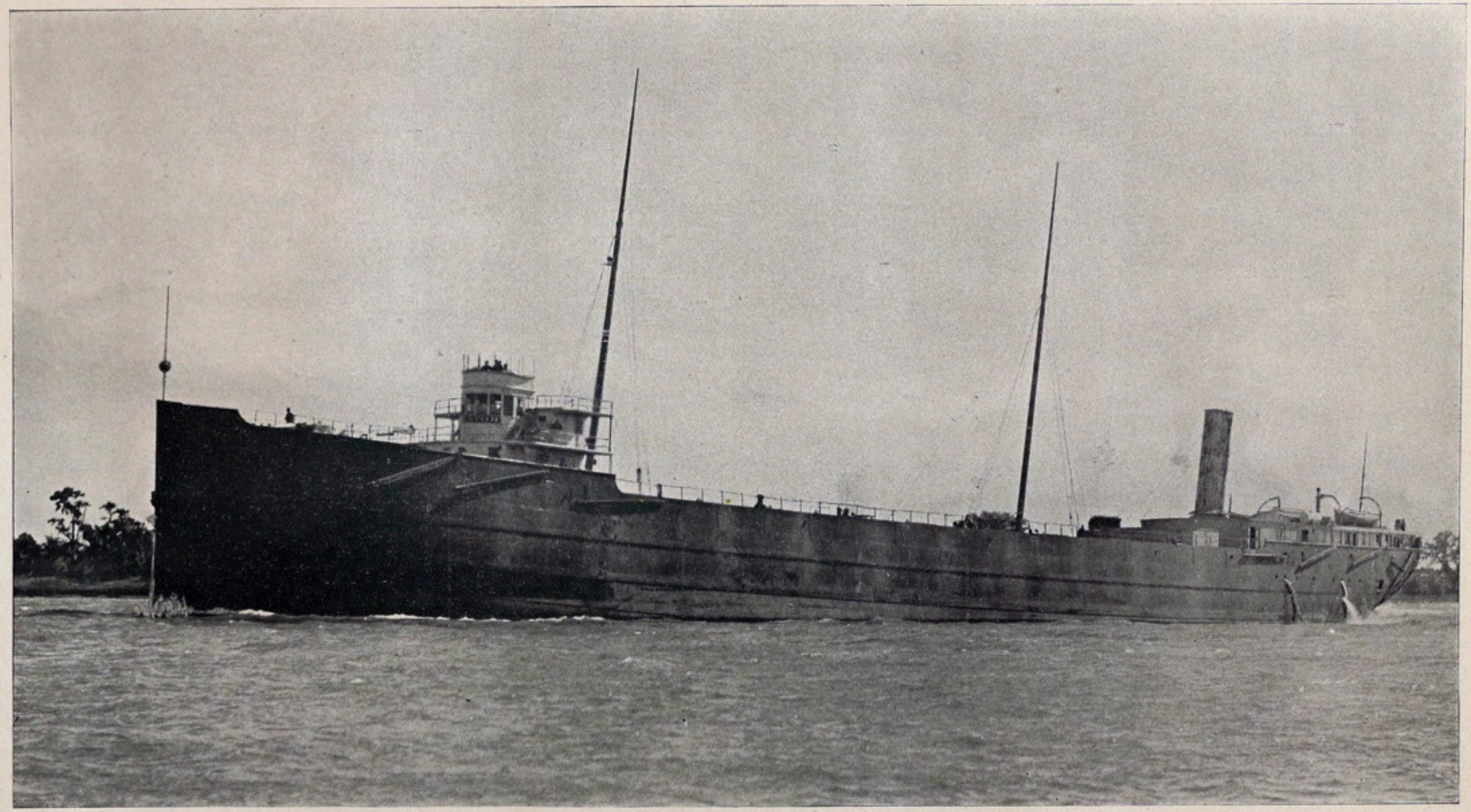
Mr. Bullard has been for many years a member of the Lake Carriers' Asscciation, and took a very active part in its management when its headquarters were in Buffalo. Not long ago he was much talked of at Cleveland and other ports for the presidency of the association, but his advancing years and declining health led him to withdraw his name from consideration.

Maps of Lake Superior Iron Ranges.

John Birkinbine's report on the production of iron ores in 1895, which is to form a part of the publications of the United States Geological Survey, and which is referred to elsewhere in this issue, contains five maps that will prove especially interesting to everybody connected with the mining companies. They illustrate the condition of iron mining in the Lake Superior region in 1895. One general map of the Lake Superior region shows the location of the different ranges. A map of the Marquette range shows the location of the mines on that range and their railroad connections, a list of the names indicating by corresponding numbers the location of each mine. A third map is a similar presentation of the Menominee range, and indicates the active, the temporarily suspended, and the abandoned mining enterprises. For this map the Geological Survey is under obligations to Mr. James E. Jopling, mining engineer of Marquette, Mich. The map of the Gogebic range shows the location of the mines which are producing or which have produced ore in quantity from the Gogebic range, and their railroad connections, but no attempt has been made to locate the numerous properties which can not be regarded as more than explorations. The fifth map, that of the Minnesota district, illustrates the location of producing mines in Minnesota, and was compiled from data supplied by Mr. Robert Angst, chief engineer of the Duluth & Iron Range Railroad, and Mr. W. J. Olcott, general manager of the Lake Superior Consolidated Iron Mines. This map does not indicate a number of properties on the Mesabi range which have been sufficiently explored to determine, by the approximate extent and character of ore, their availability for mining operations. As no exploitation followed, mention of these properties is omitted. It is noted, however, that some explored areas give promise of adding largely to the supply of iron ore obtainable from Minnesota, and that these extend the productive area beyond the limits indicated by the locations of the numbered mines. The figures are used to indicate only such mines as have produced ore and have reported their output to the United States Geological Survey.

Buffalo papers state that the Western New York & Pennsylvania coal trestle, long known as Scott's dock, as it was controlled by Scott & Co. of Erie, will be torn down and a new one built in its place for the use of Coxe Bros., who have been the lessees of late. It will be given about 7,000 tons capacity.

Port Huron's new life saving station is to be located just north of Gratiot beach and about two and a half miles above the light-house.



SUPPLEMENT TO MARINE REVIEW, NOV. 5, 189€, VOL. 14, NO. 19.

STEEL FREIGHT STEAMER SENATOR.

HULL 420 FT OVER ALL
46 " BEAM
28 " DEEP

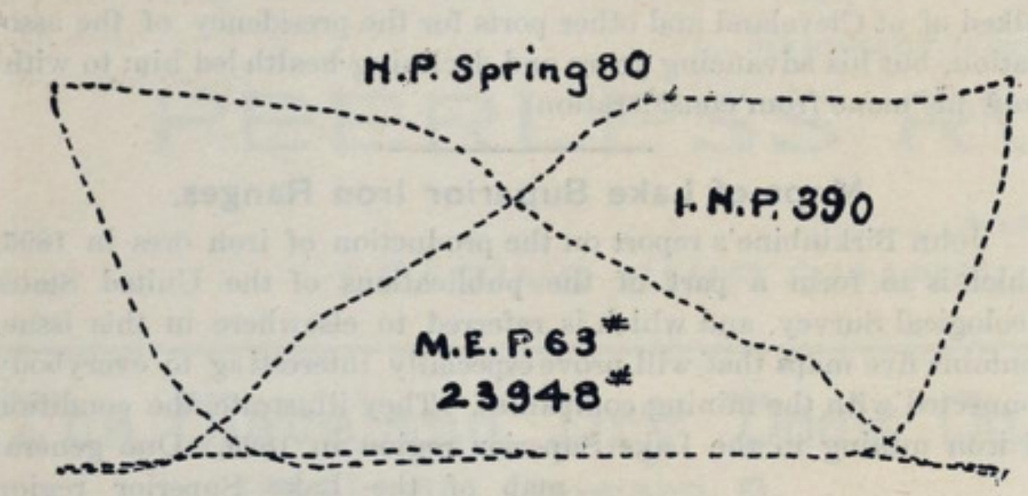
BUILT BY DETROIT DRY DOCK CO.

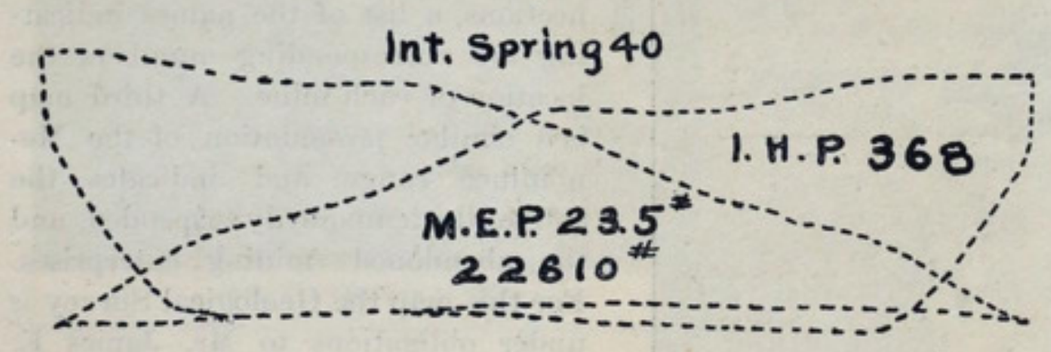
ENGINES, TRIPLE EXPANSION, CYLINDERS
22.35 AND 58 BY 44 INCHES STROKE.
BOILERS, TWO, 13 FEET 6 INCHES BY 12 FT.

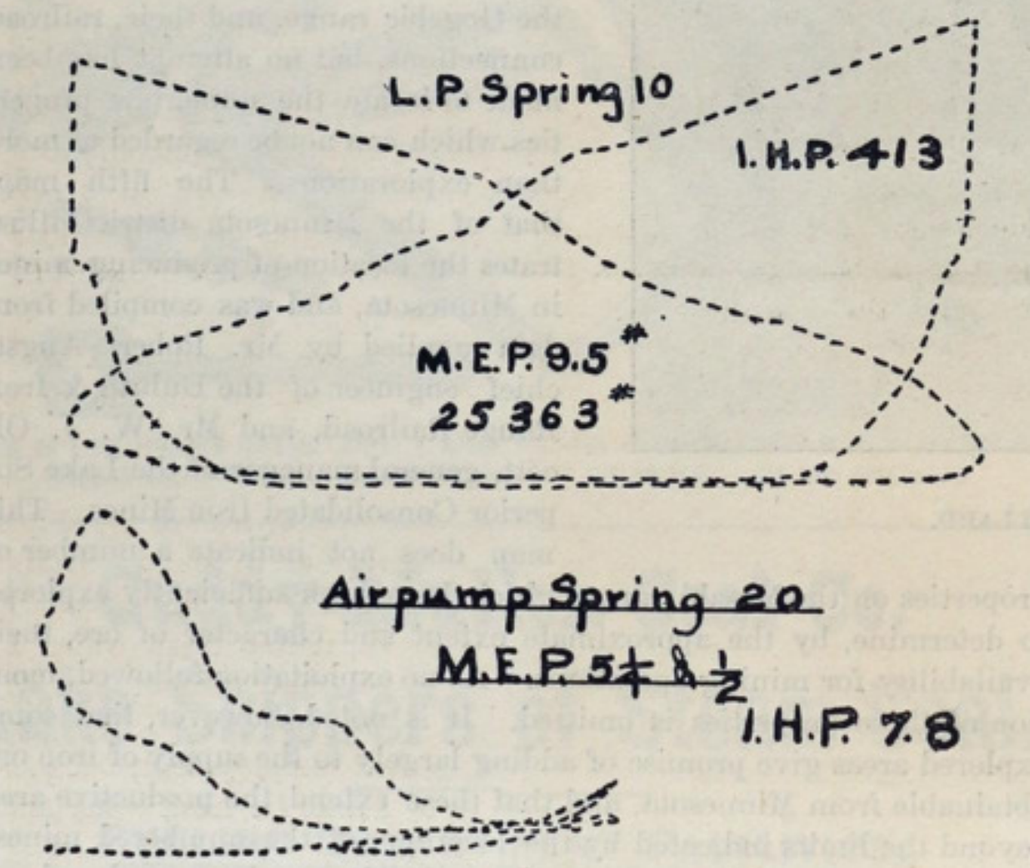
Low Fuel Record.

TEST OF STEAMER SENATOR, EQUIPPED WITH HOWDEN HOT DRAFT, SHOWS CONSUMPTION OF ONLY 1.66 POUNDS OF COAL PER HOUR PER INDICATED HORSE POWER.

Another test of one of the 400-foot steamers, this time the Senator of Detroit, will prompt vessel owners and engineers to give further attention to the question of fuel economy involved in the use of artificial draft. The Senator was built by the Detroit Dry Dock Co. and is fitted with the Howden system of hot draft, which is now in use on some forty vessels on the lakes, aggregaing about 45,000 horse





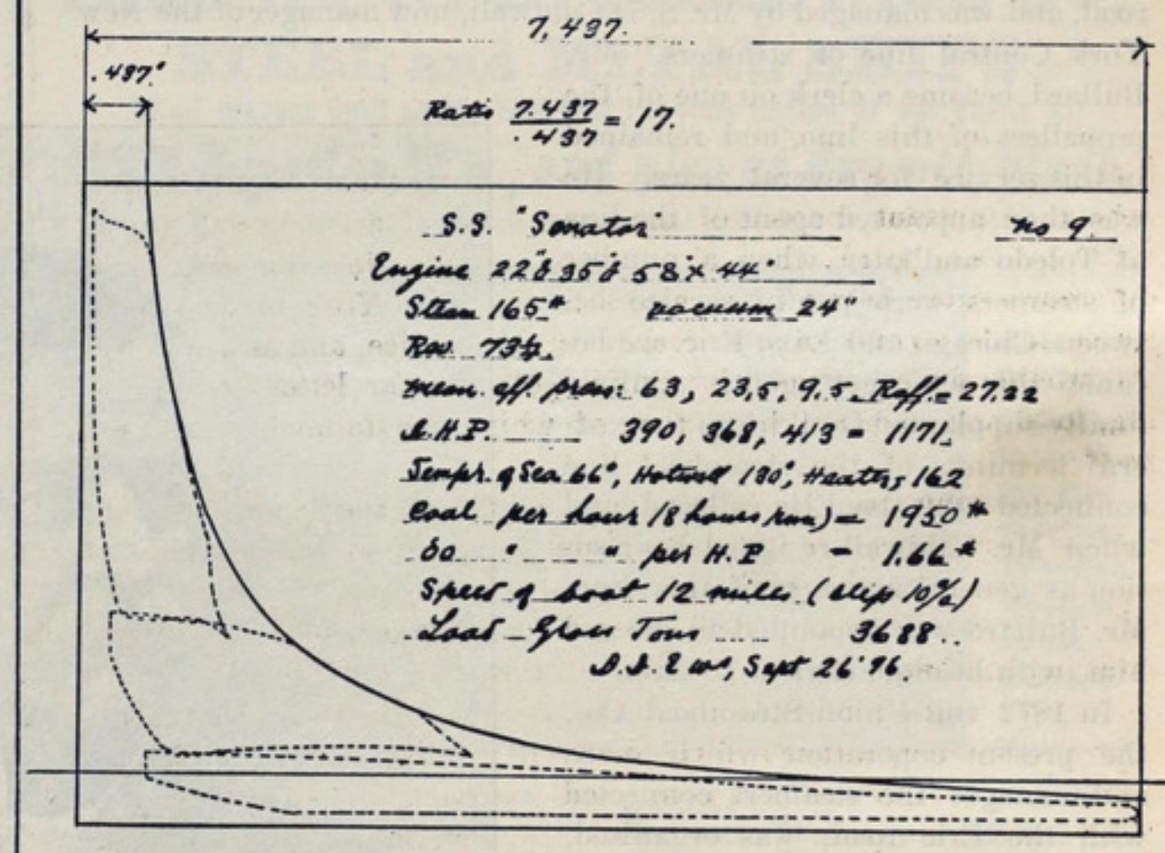


Boiler pressure, pounds	165	Indicated horse power, I. P.	368
Vacuum, inches	24	Indicated horse power, L. P.	413
Revolutions	73¼	Total indicated horse power	1.171
Indicated horse power, H. P.	390	M. E. P. referred to L. P.	27.22

power. In all parts of the world this draft is now applied to 1,212,800 horse power. Builders of the Senator are especially pleased with the trial, as it was made simply for the purpose of showing what the boat is doing in the ordinary course of business, and the main result, a consumption of 1.66 pounds of coal per horse power per hour, is certainly wonderful in a steamer that is built for competition with the best of the big cargo carriers under all conditions of freights. In this computation no deductions have been made for ashes or dampness.

At the time of gathering this data, the Senator had made seven trips. On her first trip she went from Detroit to South Chicago, returning with a grain cargo to Buffalo; then she was in the ore trade from Ashland to Ohio ports, going up light each time. Her average cost of fuel per round trip was $311.08, this amount representing 154 tons at an average price of $2.02 per ton. Her average time, loaded and light, was 12½ miles an hour. On one trip recently, she covered the distance from Sault Ste. Marie to Cleveland, 450 miles, in 37 hours 30 minutes, or 12 miles an hour loaded. It may be well to note that on the trial reported here coal was carefully weighed on platform scales and every effort made to have the figures absolutely correct.

In publishing this test the Dry Dock company submits that the Senator's creditable performance of 12 miles an hour loaded in the shallow water between Colchester and Conneaut on 1,950 pounds of coal per hour is due mainly to Howden draft, but in connection, of course, with a proportionment of engines and boilers to suit the conditions. No comparisons are made with the performance of other vessels, but in view of the attention that is being given to this question of draft, and the claims made for it in connection with the improvement that has attended marine engineering on the lakes, it may not be out of place for


7.437.
.437"
Ratio 7.437 / .437 = 17.
S.S. "Senator" No 9.
Engine 22"&35"&58" x 44"
Steam 165# vacuum 24"
Rev. 73½
Mean eff. pres. 63, 23.5, 9.5 Eff.= 27.22
I.H.P. 390, 368, 413 = 1171
Temp. of Sea 66°, Hot well 180°, Heater 162
Coal per hour (8 hours run) = 1950#
60 " " per H.P = 1.66#
Speed of boat 12 miles (allp 10%)
Load - Gross Tons 3688.
D.D. Co., Sept 26'96.

Tot. mean eff. pressure 38.87. Ratio 27.22 / 38.87 = 0.7

the Review to note that there are now on the lakes quite a large number of steel steamers, built only two or three years ago, that burn with natural draft about 2,600 pounds of coal per hour, while developing not more than 1,000 to 1,100 horse power and making not more than 12 to 12½ miles an hour loaded. On her trial trip the Senator was reported to have developed easily 1,535 horse power, which would indicate that her engine, which is small as compared with some of the big ones, is not being taxed in the service indicated herewith.

TRIAL OF STEAMER SENATOR, SEPT. 26, 1896.

Engines—Triple expansion with cylinders 22, 35 and 58 inches by 44 inches stroke. Air pump 30 inches diameter by 15 inches stroke, with 18 inches diameter trunk.

Boilers—Two cylindrical, 13 feet 6 inches diameter by 12 feet long, allowed 165 pounds pressure. Furnaces 48 inches diameter, 5 feet 6 inches grate bars; 88 square feet grate surface; total heating surface, 4,130 square feet; ratio heating surface to grate surface=47.

Fan wheel—57 inches diameter by 28 inches wide.

Fan engine—7 feet by 7 feet, vertical.

Heater—20 inches diameter by 8 feet long over all; heating surface, 87 square feet.

Propeller—Sectional, four bladed, 13 feet 10 inches diameter by 16 feet pitch; 58 square feet expand area.

Load, gross tons	3,688
Draught, feet and inches	14 —4
Steam pressure, pounds	165
Vacuum, inches	24
Indicated horse power, H. P	390
Indicated horse power, I. P.	368

Indicated horse power, L. P.	413
Indicated horse power, total,	1,171
Indicated horse power, average for run	1,175
Indicated horse power, air pump	7.8
Per cent. air pump of total	.007
Revolutions of main engine, average	73¼
Revolutions of fan engine, average	140
Air pressure at fan, average, inches,	1⅞
Ratio of horse power to grate surface	13.35
Ratio of heating surface to horse power	3.55
Duration of trial, hours	8
Place of trial	Colchester to Conneaut
Total coal burned, pounds	15,600
Coal burned per hour, pounds	1,950
Coal burned per hour per I. H. P., pounds	1.66
Speed of boat, miles	12
Speed of propeller, miles	13.31
Slip of propeller, per cent	10
Temperature of injection water, degrees	66
Temperature of hot well, degrees	130
Temperature of heater, degrees	162

Assistant Steamboat Inspectors.

It would seem that officials of the treasury department have decided that there shall be no misunderstanding as to the relations existing between assistant inspectors and inspectors of steam vessels in the different local boards throughout the country. Not long ago, some differences arose between inspectors in the New York office, which seems to be a point of disturbance in the service, and as a result of this trouble the department has published a circular letter to suprevising, local and assistant inspectors, of which the following is an extract:

"It having been brought to the attention of the department that the assistant inspectors at some of the ports are assuming authority belonging only to the local and supervising inspectors, by condemning steam vessels or their boilers, thus preventing their further use, assistant inspectors are hereby informed that such practice must be discontinued, as the condemnation of the hull or boiler of a steam vessel is, under the law, sections 4,417 and 4,418, revised statutes, an act requiring 'the exercise of judgment and discretion,' whereas the duties of the assistant inspectors are merely 'ministerial and mechanical,' and they can act in that respect only under the immediate supervision and direction of the local inspectors or supervising inspector. Assistant inspectors are therefore instructed that the extent of their duties, upon completing the examination of a steamer, her hull, boilers, or equipments, under proper directions, is to report to the local inspectors or supervising inspector, except as may be otherwise ordered by the local inspector or supervising inspector under whom they are acting. This report must be confined to a detailed description of the actual condition of the steamer, her hull, boilers, or equipments, and the nature of the repairs required, if any are needed. It will then be the duty of the local inspectors (or supervising inspector) to determine from such reports the propriety of the issuance of a certificate. All communications to the master, agent or owner of a steam vessel in regard to needed repairs, must be made in writing over the signature of the local inspectors or supervising inspector under whose directions the examination of a steam vessel was made. Local and supervising inspectors, however, are cautioned never to order such extensive repairs as would amount to the practical condemnation of a vessel, her hull or boilers, on the report of an assistant inspector, without first satisfying themselves, by a personal examination, that such vessel, her hull or boilers are unfit for further use."

No Early Closing of Canadian Canal.

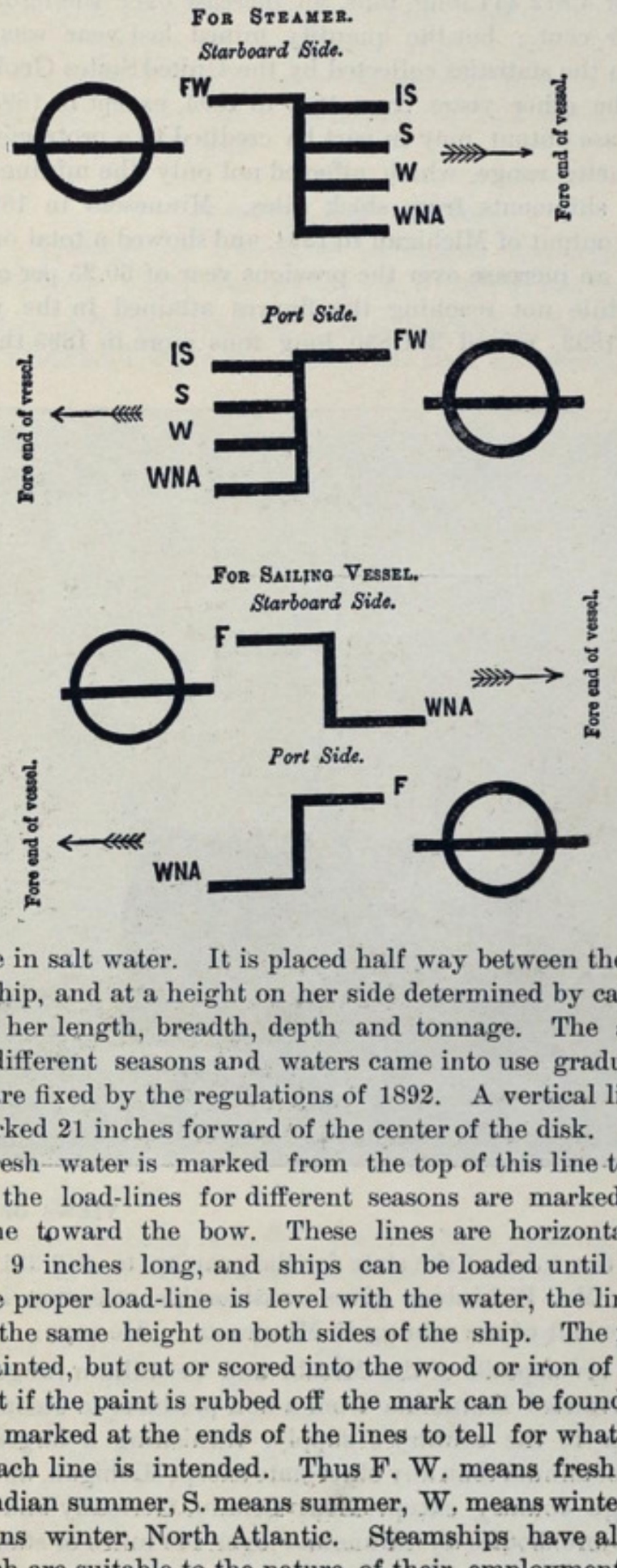
Editor Marine Review:—Several captains passing through the lock here have asked if the current report that the Canadian Sault canal was to be closed on Nov. 15 was true. So far no notice has ever been taken of the slanderous tales told about this lock by interested parties from Sault Ste. Marie, Mich., but I wish once for all to inform these parties, and the vessel men in particular, that the Canadian Sault canal will be in operation twenty-four hours in the day until the close of navigation, notwithstanding their tales to the contrary.

Sault Ste. Marie, Ont., Oct. 30, 1896. J. Boyd, Sup't.

Load-Line Marks.

Everybody who has a knowledge of vessel matters has heard of the Plimsol mark on British ships and has some knowledge of the conditions that brought about regulations in Great Britian governing the depth to which vessels may load. But the original load-line acts have undergone several changes and they have of late years been arranged to suit different seasons. In the November number of St. Nicholas, J. M. Ellicott, U. S N., has an interesting article on the subject.

The original Plimsoll mark, established for British ships by the act of 1876, was the disk shown in the accompanying engraving with the horizontal line through its center, the upper edge of the horizontal line indicating the depth to which a vessel could be loaded for a sum-



mer voyage in salt water. It is placed half way between the bow and stern of a ship, and at a height on her side determined by calculations based upon her length, breadth, depth and tonnage. The additional lines for different seasons and waters came into use gradually after 1876, and are fixed by the regulations of 1892. A vertical line 1 inch wide is marked 21 inches forward of the center of the disk. The load-line for fresh water is marked from the top of this line toward the stern, and the load-lines for different seasons are marked from the vertical line toward the bow. These lines are horizontal, 1 inch broad and 9 inches long, and ships can be loaded until the upper edge of the proper load-line is level with the water, the lines being marked at the same height on both sides of the ship. The marks are not only painted, but cut or scored into the wood or iron of the ship's side, so that if the paint is rubbed off the mark can be found. Initial letters are marked at the ends of the lines to tell for what season or condition each line is intended. Thus F. W. means fresh water, I. S. means Indian summer, S. means summer, W. means winter, and W., N. A. means winter, North Atlantic. Steamships have all of these marks which are suitable to the nature of their employment, but sailing ships, beside the disk, have only the marks for fresh water and North Atlantic winter.

California is convenient. Comfort, speed and economy in rates are the distinguishing characteristics of the fast western express leaving Cleveland daily at 10:58 a. m. via the Nickel Plate road, and reaching Chicago at 9:00 p. m. same day, and our night express arriving at Chicago at 7:40 a. m. daily. Direct connections at Chicago with all the leading lines for Los Angeles, San Diego, and San Francisco. Through tickets and baggage checks. Sleeping car space and all details arranged by any agent of the Nickel Plate road. Cleveland city ticket office, 224 Bank street. 380 Nov. 20

A photograph of the largest boat on the lakes, the Sir Henry Bessemer, will cost you only $1.50. Write the Marine Review.

Iron Ore Production in 1895.

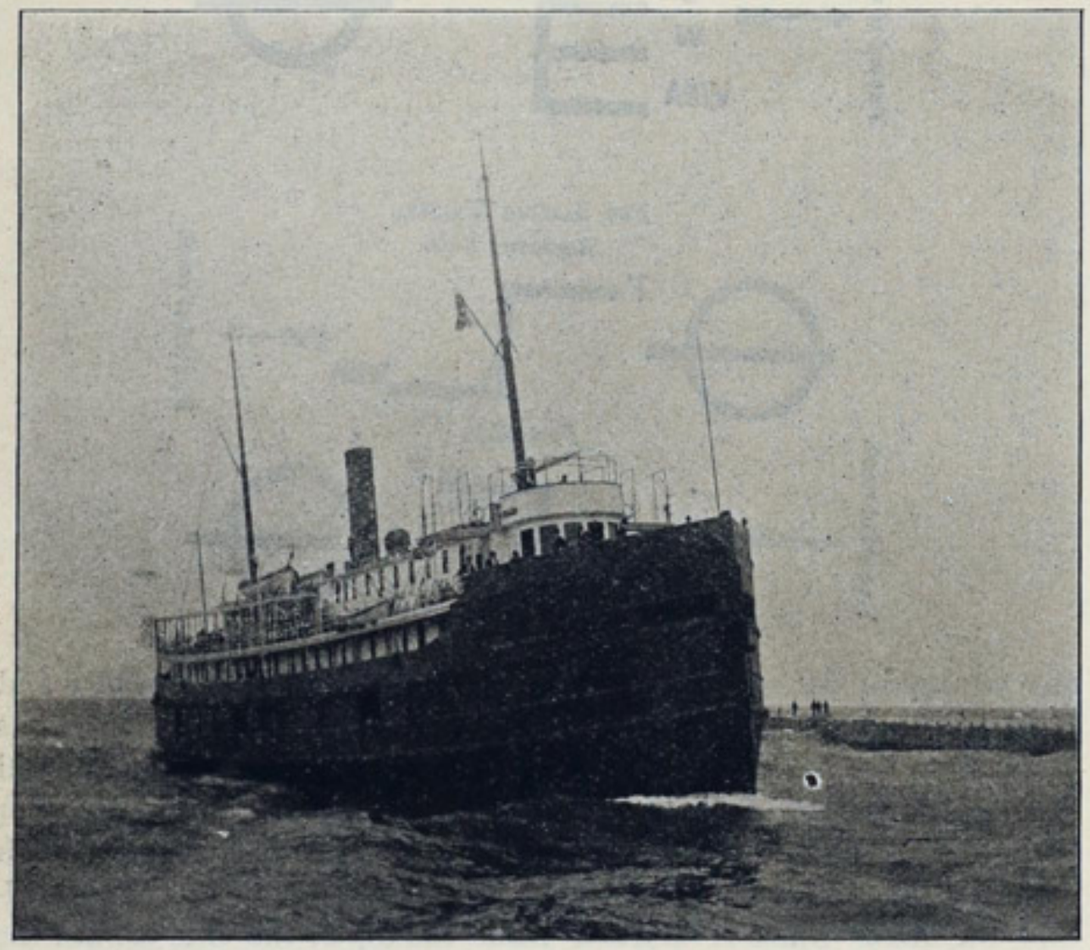
In 1895 the Lake Superior ore districts produced 62.31 per cent. of the iron ore supply of the United States. In 1894 the proportion from the Lake Superior region was 63.85 per cent., and in 1893 it was 54.44 per cent. The term "ore supply" includes ore imported. The total production (no imported ore included) in 1896 was 15,957,614 gross tons, and of this amount 10,268,978 tons, or 64.32 per cent. was produced in the Lake Superior region. These figures are from an exhaustive report prepared by John Birkinbine of Philadelphia and just issued in pamphlet form by the United States Geological Survey. The production of 1895 is exceeded only by the outputs of 1890 and 1892. Michigan still leads with an output for 1895 of 5,812,444 long tons, an increase over the figures for 1894 of 31.5 per cent.; but the quantity mined last year was below that reported in the statistics collected by the United States Geological Survey for the other years from 1889 to 1895, except in 1893 and 1894. This decrease output may in part be credited to a protracted strike in the Marquette range, which affected not only the mining of ore, but prevented shipments from stock piles. Minnesota in 1895 approximated the output of Michigan in 1894, and showed a total of 3,866,453, long tons, an increase over the previous year of 30.25 per cent. Wisconsin, while not reaching the figures attained in the years 1889, 1890 and 1892, mined 301,850 long tons more in 1895 than in 1894, bringing the total of the state for the year up to 649,351 long tons. Of course Mr. Birkinbine gives considerable attention in his report to development of ore mining in Minnesota. He says:

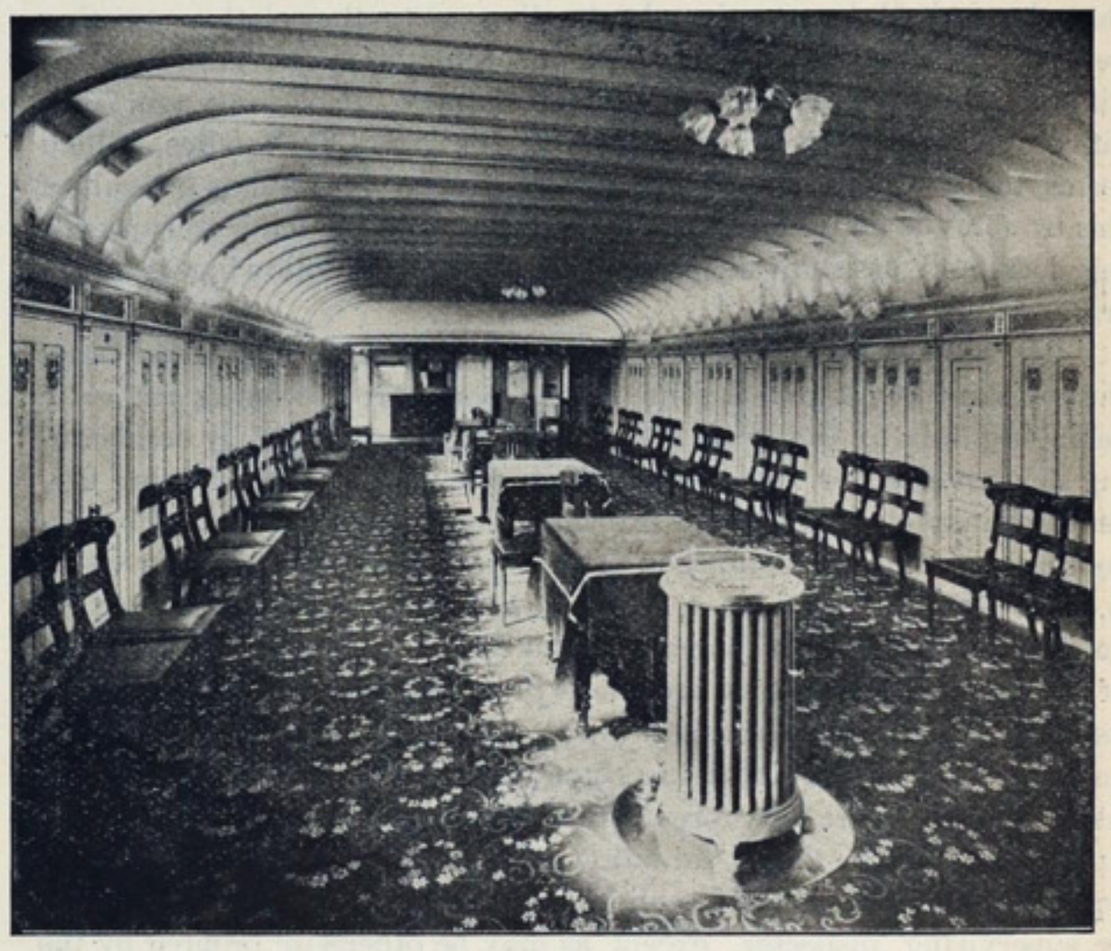
"The ore deposits of the Mesabi and Vermillion ranges have in a decade advanced Minnesota from a non-producer to second rank as a contributor to the country's supply, furnishing a larger amount of iron ore per annum than any other state except Michigan, and more than any foreign country except Great Britain, Germany and Spain. To reach the ore bodies of Minnesota over 400 miles of standard-gauge railroad have been built and equipped with modern locomotives and cars through what was a trackless wilderness ten years ago, and in fact much of the ore producing country was visited only as hunting ground within three or four years.

"It will not be surprising if in the future a portion of the Minnesota ores find a market at or near to the head of the lakes, for, notwithstanding the apparently unsatisfactory outcome of ventures in iron and steel production at Duluth and West Superior, enough was accomplished to demonstrate that when ample capital is at command to erect the necessary converting and manufacturing plant, to buy material best suited to requirements, and to introduce the product into a market already supplied by established industries, projects of this class will become profitable. With the wealth of iron ores convenient, and the low rates at which fuel can be brought to Lake Superior, the production of metal for the growing territory to the west seems to offer many opportunities. A failure to treat ore not at present apparently valuable so that it may in the future be obtained for use would evidence a want of faith in the future of the northwest, and it is well for those who have at command ores below the accepted standard to remember that the average yield of all the iron ores used in the United States does not exceed 54 per cent., while the phosphorus in non-Bessemer Mesabi ores is below that of the average non-Bessemer ores of the country.

"The longer rail and water transportation now required to bring the ores of Minnesota to blast furnaces which can use them gives the ores from other ranges an advantage equivalent to from 60 to 80 per cent. of the net mining cost, and the limitations placed upon ores acceptable as of Bessemer grade restrict the output of the Mesabi range. But its large reserves of ore, which are above the average in iron and below the average in phosphorus of domestic ores now used, will seek a utilization and it is not improbable that these deposits will further stimulate the present rapid development of the basic open hearth method of steel production. The development of the Vermillion and Mesabi ranges in Minnesota practically repeats, with local modifications, what took place on the Marquette, the Menominee, and the Gogebic ranges of Michigan and Wisconsin. The early exploitation of the Marquette iron ore mines shares with the initial work in the copper mines the credit of opening up northern Michigan within half a century, and the iron ores of the Menominee range were responsible for the development of the interior section of the Upper Peninsula less than two decades ago. Similarly, the timber clearings, railroad and town building, etc., on the Gogebic range of Michigan and Wisconsin to secure the soft ores, which lay unused until slightly over ten years past, were contemporaneous with the bold venture which brought into market the excellent ores from the Vermillion range in Minnesota."

"The quantities of ore in sight, the apparent ease of mining and the grade of material won on the Mesabi range may be pronounced marvelous. But the other ranges each in turn were surprises, and have done their part in making the Lake Superior region the greatest iron ore producing district of the world, for no other section has in forty years supplied 100,000,000 tons of this mineral."





VIEWS OF NEW GOODRICH LINE STEAMER IOWA.

Grain to the amount of nearly 15,000,000 bushels was delivered at Buffalo during the latter half of October. Total receipts at Buffalo to Nov. 1 are: Grain, including flour, 169,322,382 bushels; grain, not including flour, 132,456,052. Receipts to Nov. 1, 1895, were: Grain, including flour, 116,549,810 bushels; grain, not including flour, 84,586,310. Receipts of grain, including flour, are now more than 11, 000,000 bushels in excess of receipts to Nov. 1 in the banner year, 1893. During October receipts of grain aggregated 27,522,826 bushels, against 20,077,590 bushels in October, 1895, and the receipts of flour footed up 1,586,353 barrels, against 1,377,670 barrels during the corresponding month in 1895.

The Review has excellent photographs of lake ships.

Ship Yard Matters.

Now that the presidential election is settled in a manner highy satisfactory to the iron ore and vessel interests of the lakes, it is more than probable that several contracts for new steel ships will be announced shortly. Some of the ship builders have said, in fact, that they have negotiations under way that were dependent upon the result of the election. It is known that considerable figuring has been going on, in which the matter of price was the main consideration, and now that there is a general restoration of confidence, it is expected that owners who have thought of building new vessels will be inclined to meet the prices of builders more so than they were before the election. Although summer freights were lower than ever before on wild cargoes, the season's business as a whole has not been unprofitable to the vessel owners. Most of them have had some contract ore at liberal freights, and the advances of the past month in the freight market have helped to even up losses sustained during the summer months. With a profitable close of business for the season, it is quite probable that there will be considerable ship building during the winter. It is announced from West Bay City that Capt. James Davidson is preparing to lay keels for two big wooden steamers. It is also intimated that Capt. Davidson has a scheme on foot with reference to the two big harbor tugs which he has just completed that may disturb some of the tug companies. A plan of doing his own towing by putting these tugs into commission at one of the Lake Erie ports, probably Buffalo, is spoken of. On an arrangement of this kind the tugs would, of course, have to seek business other than that provided by Davidson boats, and they would therefore be competing for general business in whatever port they may be located.

With three big steel steamers undergoing repairs in Cleveland during the past ten days, the two ship building companies have been prompted to great efforts in showing rapid work. This competition has given Cleveland a reputation in the matter of quick work on repairs of steel ships. The Globe company had the Mariska and Saxon under repairs, but the work on these vessels was not as extensive as other jobs undertaken during the past summer. Repairs on the steamer L. C. Waldo, made by the Cleveland Ship Building Co., were of a very extensive kind, and a record was made on the job. The Waldo struck several days ago at the Encampment in the Sault river. The damage extended for about 210 feet along the bottom of the ship, requiring eighteen plates to be removed, eight of which were renewed, and the others re-rolled and replaced. The surface covered by the eighteen plates amounted to about 18,000 square feet. There were eighty-eight frames bent and broken, fifty-six of which were renewed, the rest being straightened and replaced. Forty-six floors were taken out, straightened and replaced. The bottom being constructed on the cellular plan, the inside damage was much more extensive than the number of plates taken off would indicate. The longitudinal girders in the bottom were badly damaged and several plates had to be renewed. The boat was in the dry dock only eight days and eight hours. In the course of this work between 30,000 and 40,000 steel rivets were removed and replaced.

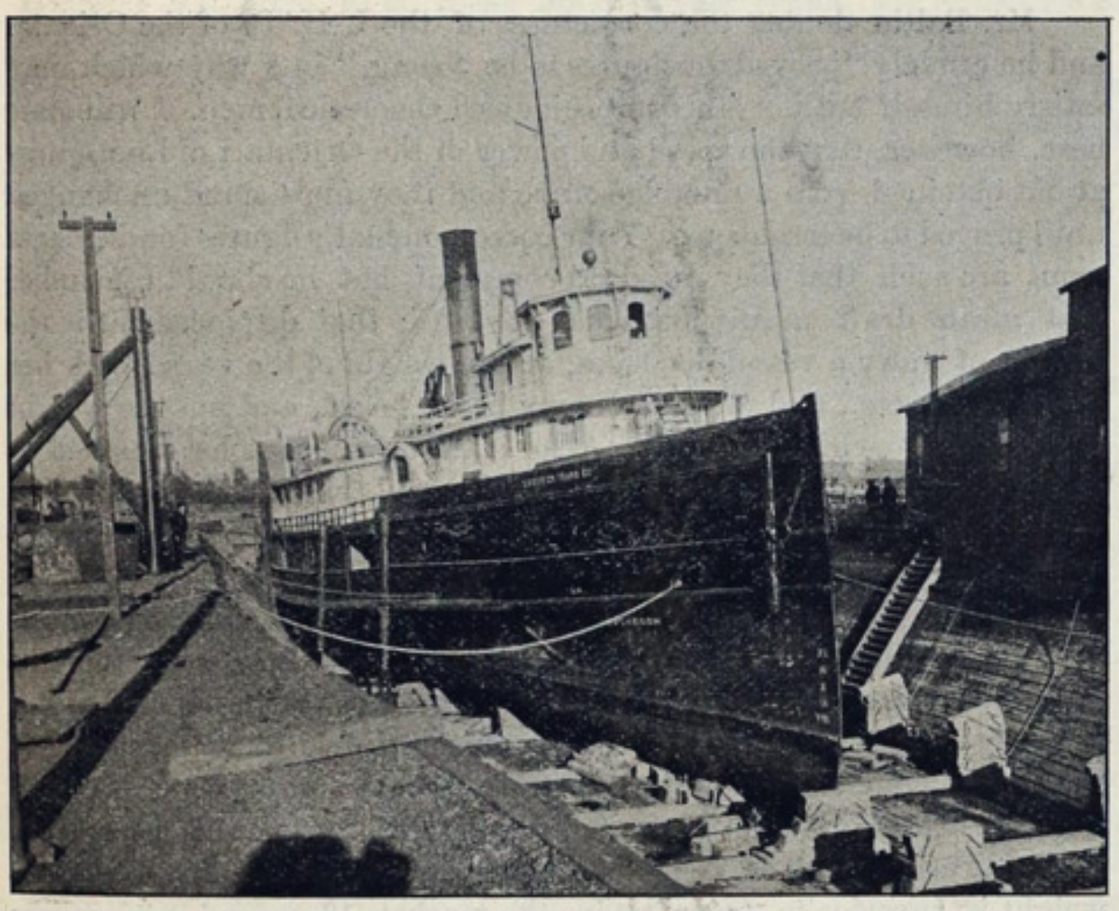
It is again announced that the American Steel Barge Co. will build on its own account at West Superior during the winter a whaleback steamer that will be larger than any vessel now afloat on the lakes, and which will be named Alexander McDougall. This announcement is very probably correct, as the barge company will close the present season with big profits, as their vessels were all contracted for ore at $1 and $1.05 from the head of Lake Superior. The tow barges 201 and 202, which were built on the Atlantic coast several years ago and brought to the lakes early in the season, have been placed in the large stationary dry dock at West Superior preparatory to being hauled out, cut in two, and lengthened 62 feet each.

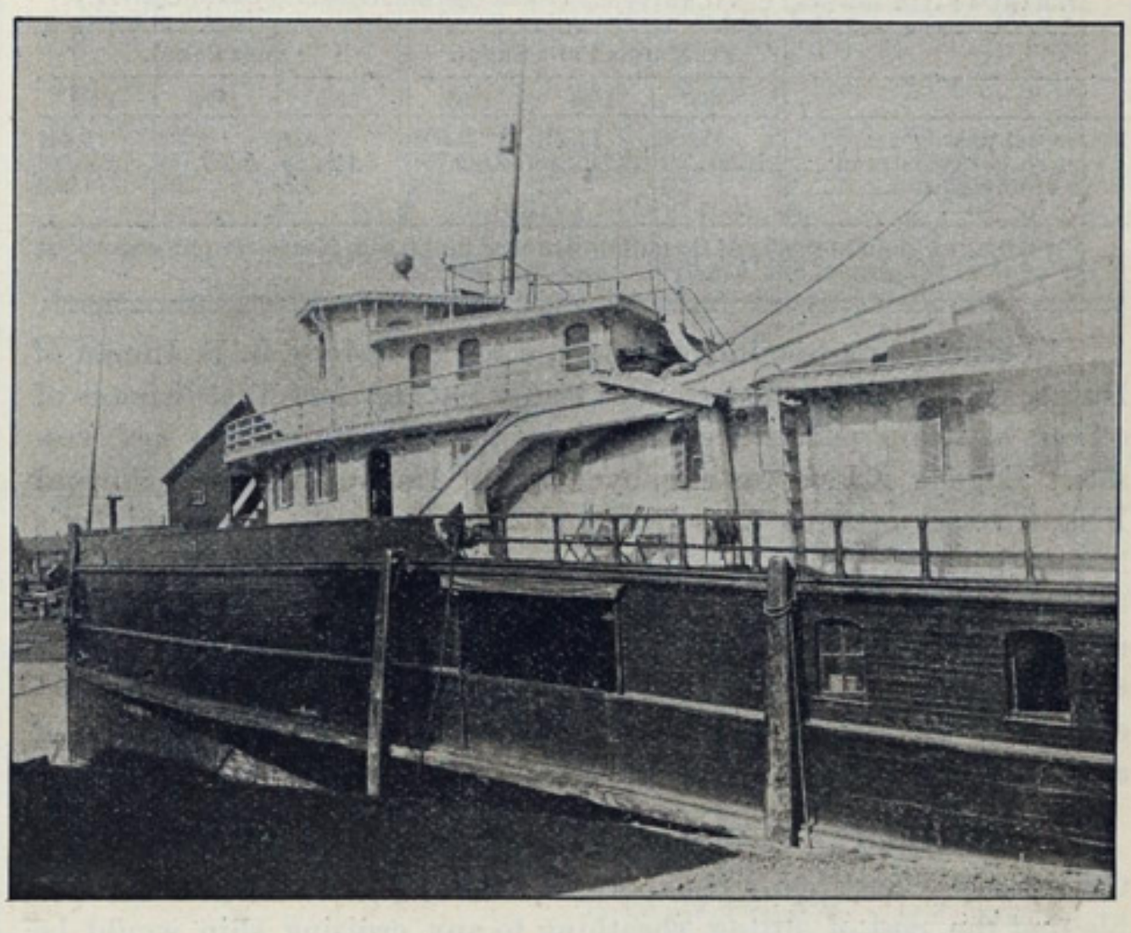
Repairs to the passenger steamer Nyack, made by Burger & Burger of Manitowoc, involve an expenditure of about $20,000. The vessel, which is owned by E. S. Crosby of Muskegon, Mich., will be rated at A1½ in the next supplement of the Inland Lloyd's register and will be given a valuation of $35,000.

Around the Lakes.

J. C. Gilchrist of Cleveland purchased the small passenger steamer Favorite, which was sold by the United States marshal.

A mark of the approaching close of navigation is at hand. "The original Cleveland tug men" announce their nineteenth annual ball at Lang's hall, Tuesday evening, Dec. 1, 1896. The tug men are on deck early, as they know that festivities of this kind come with a rush after the first fall blow.





STEAMER MUSKEGON AFTER ACCIDENT IN MILWAUKEE DRY DOCK CO'S. DOCK.

Bartlett & Tinker, Cleveland agents of the Lake Superior Transit Co., announce that the last of the company's boats for Duluth and Lake Superior way ports will leave Cleveland on or about Nov. 7.

Buffalo newspapers are advocating the establishment of a marine postoffice at some central point on the river front in that city. In all the large lake ports letter carriers find difficulty in distributing mail matter for men aboard vessels, and much of it is left at the offices of tug companies, ship chandlers, etc., to be returned later to the dead letter bureau.

Mr. Laurier, Canadian premier, informed a delegation that called on him recently that he favored a 30-foot channel between Montreal and Quebec and 14-foot canals west of Montreal. The channel between Montreal and Quebec is now 27½ feet. The Welland canal has 14 feet of water on the sill, but between that and Montreal there is no canal with as great depth all the way through.

For the second time Moses W. Humphrey of Detroit has lost his suit against the Eddy Transportation Co., brought to recover $1,000 for commissions in effecting the sale of the steamer John F. Eddy and barge John Shaw to the Detroit Dry Dock Co. in February, 1892, which company in turn resold them to the Sulphite Fiber Co. The case will be appealed to the Michigan supreme court.

MARINE REVIEW

DEVOTED TO LAKE MARINE AND KINDRED INTERESTS.

Published every Thursday at No. 409 Perry-Payne building, Cleveland, Ohio, by John M. Mulrooney and F. M. Barton.

SUBSCRIPTION—$2.00 per year in advance. Single copies 10 cents each. Convenient binders sent, post paid, $1.00. Advertising rates on application.

Entered at Cleveland Post Office as Second class Mail Matter.

The books of the United States treasury department on June 30, 1895, contained the names of the 3,342 vessels, of 1,241,459.14 gross tons register in the lake trade. The number of steam vessels of 1,000 gross tons, and over that amount, on the lakes on June 30, 1895, was 360 and their aggregate gross tonnage 643,260.40; the number of vessels of this class owned in all other parts of the country on the same date was 309 and their tonnage 652,598,72, so that half of the best steamships in all the United States are owned on the lakes. The classification of the entire lake fleet on June 30, 1895, was as follows:

	Number.	Gross Tonnage.
Steam vessels	1,755	857,735.13
Sailing vessels	1,100	300,642.10
Unrigged	487	83,081.91
Total	3,342	1,241,459.14

The gross registered tonnage of the vessels built on the lakes during the past five years, according to the reports of the United States commissioner of navigation, is as follows:

Year ending June 30, 1891	204	111,856.45
" " " 1892	169	45,968.98
" " " 1893	175	99,271.24
" " " 1894	106	41,984.61
" " " 1895	93	36,352.70
Total	347	335,433,98

ST. MARY'S FALLS AND SUEZ CANAL TRAFFIC. (*From Official Reports of Canal Officers.*)

	St. Mary's Falls Canal.			Suez Canal.		
	1895*	1894	1893	1895	1894	1893
No. vessel passages	17,956	14,491	11,008	3,434	3,352	3,341
Tonnage, net registered	16,806,781	13,110,366	9,849,754	8,448,383	8,039,175	7,659,068
Days of navigation	231	234	219	365	365	365

* 1895 figures include traffic of Canadian canal at Sault Ste. Marie, which was about ½ per cent. of the whole, but largely in American vessels.

In remitting a fine imposed upon a tug owned by B. B. Inman of Duluth the treasury department brings out the fact that licenses of officers of steam vessels are graded by the gross tonnage of such vessels. Eugene Miller was employed by Mr. Inman on the tug Edward Fisk, a vessel of 43.05 tons gross and 21.93 tons net. The engineer's license permitted him to act on steam vessels of 25 tons, but did not designate gross or net tons. The tug was fined $100, but the fine was remitted, as it was the opinion of the acting secretary of the treasury that there was no intention to violate the law. It was stipulated, however, that the law should be complied with by the employment of an engineer entitled to act on the tug.

In discussing the subject of sheathing the bottoms of steel ships, Chief Naval Constructor Hichborn says that the fact seems incontestable that the cost of fitting sheathing to any cruising ship would be more than saved during a single three years' cruise by the decrease in coal and docking bills, without considering the question of the ability of the ships to maintain the speed for which they were designed. There has been a strong prejudice in the navy against sheathing and the first departure from the established practice has been the composite construction of the six new gunboats now building. These vessels will unquestionably be of far greater value and be much less expensive to maintain from the fact of their bottoms being coppered.

Officers of the Lake Carriers' Association who visited Washington a few days ago in the interest of more lights, fog signals, gas buoys, etc., for the lakes are highly pleased with the reception which they received at the hands of Admiral Walker, Commander Wilde and other members of the light-house board. They are of the opinion that their co-operation with the board while reports are being made up has resulted in a thorough understanding as to what is most needed in the way of aids to navigation. With so much accomplished the officers of the association may be depended upon to do their part towards securing appropriations when congress assembles.

One of the leading firms that manufacture dynamos and motors in this country is at work upon a motor that will run at a speed of 10,000 revolutions per minute. This motor, if it can be successfully constructed, will be used by the United States government on men-of-war to start the propelling machinery of Howell torpedoes just before they are fired from their tubes. This torpedo is propelled by the energy stored in a small fly-wheel inside of it, made to revolve at a speed of 10,000 revolutions, and at present a steam turbine is the only motor of simple form that is available to rotate the fly-wheel at that speed.

Although the only new vessels asked for in the report of the construction bureau of the navy are two composite sailing vessels of 1,100 tons, costing $500,000, as practice cruisers for the Naval Academy, it is not expected that these will conflict with the recommendation for three additional battleships which Secretary Herbert is confidently expected to make in his annual report.

A Cleveland vessel owner who is well posted in insurance matters estimates that unless losses for the balance of the season are unusually heavy the underwriters doing business on the lakes will make a million dollars on this season's insurance on hulls, without any reference to profits on cargoes.

A Final Letter from Mr. Fairburn.

Editor Marine Review:—I received today an issue of the Review for Oct. 1, in which appears two interesting letters in reply to my letters on the Enquirer-Say When race, etc. As all my data and papers bearing on the subject are in Bath, Me., I am not in a position and neither have I time nor inclination to go further into the subject. Allow me to state, however, that all my figures for dimensions of the Say When and Enquirer are based on those given by Mr. Ballin. If the foundation is wrong, it stands to reason that my calculations will not be accurate, but that is certainly not my fault.

Mr. Ballin doubts the correctness of the I. H. P. of the Orienta, and he crudely "proved the figures to be wrong," in a way which may satisfy himself but not other unprejudiced theoretical men. I will state here, however, that the speed and power of the Orienta I did not guess at but obtained from a reliable source and they must stand unchanged until proved to be erroneous. Your correspondent's figures for displacement are such that they need no comment, but he should remember that mean draft means just what it states; that displacement is the weight of water a vessel displaces, or the weight of the vessel with her coal, stores, etc., and whatever may be on board, and not the weight of hull and machinery alone. Also, if the dimensions he supplied us with are correct, my figures remain unchanged, but if not correct, then I am sorry that I have wasted very valuable time working on unreliable data.

I thank Mr. Thrall for having answered my questions as regards the Taylor boiler. I have never seen this boiler, and I naturally thought that the cut as published in the Review was correct in detail, but apparently it was not. Yet, on this subject of theoretical efficiency of water tube boilers we might argue forever and not arrive at any definite conclusions. If the Taylor boiler weighs but 8.3 pounds per square foot of heating surface, then I acknowledge that the boiler as regards weight is superior to any now in the market, 12 pounds per square foot being a very good standard for weight of modern water tube boilers. I will also state here that I am not interested financially in any water tube boiler, but I have noticed the great success of the Almy boiler on the coast, and I merely used it in my comparison as a typical high-class modern and successful water tube boiler.

It is especially annoying to me to find that during this discussion figures which were given as accurate at the commencement have since been proved to vary in some cases as much as 50 per cent., and even now, I must confess, as an unprejudiced party, that I greatly doubt many of the figures given out by interested parties as accurate. In entering a discussion such as this has been, it would be well for all to remember that it is best not to give any figures unless their accuracy can be vouched for, and if any estimating is done, then it should be stated as such, so that any interested party can accept or refuse these figures as he sees fit. As the figures I had worked on are now in many cases said to be incorrect, then the result of my calculations and comparisons are not worth the paper they are printed on, and we know very little more now than we did when we started. I am afraid, in fact, that we do not know as much, because there is doubt now in our minds as to the accuracy of almost all figures which are at this stage stated as authentic, which by the time this letter reaches you may have been proven to be incorrect also. William A. Fairburn.

Glasgow, Scotland, Oct. 21, 1896.

If we did not get your boat in the list of sixty which we had photographed in the Detroit river, we can get a picture of her if she passes the Sault in daylight.

Comment on the Test of the Waldo.

Editor Marine Review:—As one who has noted with interest the different tests recorded of lake steamers, I think there is a point or two worth noting in that of the Waldo, reported recently in your columns. The performance is as a whole creditable, especially the boiler efficiency shown, though I think a better engine efficiency than that shown by the reported water consumption might reasonably have been looked for from engines of this size. However, it is quite possible both that the meter was at fault and that the different auxiliaries were extravagant in water consumption, since I note that no charge is made against them in the water account. The thing that interests me chiefly, however, is the air pump performance. I note that the I. H. P. of air pump is only a trifle over one-half of one per cent. of the total of main engines. In the report of the test of the Harvey H. Brown the per cent. of air pump of total is a fraction over one per cent., and the statement is made that this figure settles the question of the economy of connected vs. independent air pumps. But does it? This is, so far as I know, the first instance of a test of a lake steamer in which the I. H. P. of an indepedent air pump is reported, and I think the showing is rather strongly in favor of this system. I do not think such a result is possible with any but the single form of pump, though this would undoubtedly be a subject of dispute. It may be claimed that the attached pump does its work more economically by its having the benefit of using steam expansively, but I do not think this can be made to hold good. Aside from the fact that the difference in power is rather too great to be made good by that means, the resistance to the main engine, and which is felt directly in the diminished revolutions of the wheel and consequent reduced speed of vessel, is to be taken into account. Added to this, the steam employed in operating pump is not all to be charged, because of its returning a part of its energy in the shape of increased temperature imparted to the feed water.

I note that the feed temperature in this case is raised about 60 degrees by the exhaust steam, of which the air pump contributed its share. It seems quite clear to me from every point of view that this system is the best for steamers whose runs are of any considerable length, though as I have already said, I do not think such good results can be obtained from any but a single pump. In conclusion I do not think the report does the engines justice in the matter of referred M. E. P. In test No. 4, for instance, I make it over 34 pounds, whereas the report only gives it as a little over 30 pounds. Buffalo.

Buffalo, N. Y., Oct. 31, 1896.

Defending the Oglebay

Editor Marine Review:—I note in your paper this morning the item of Mr. Edward Gaskin of the Union Dry Dock Co., Buffalo, with reference to the Oglebay-Owego affair of several days ago, and with all due respect to the aforenamed gentleman I must say that he is "away off" when he attempts to belittle the performance of the Oglebay in saying she is a fourteen-mile an hour boat. While I have no particular interest in the Oglebay, she is in many respects, as regards machinery, etc., a duplicate of the Centurion, with which I am somewhat familiar, and this latter boat made a run last August across Lake Erie at the rate of 16½ miles an hour. We can turn the Centurion up faster than that if necessary, and as the owners of the Oglebay claim she is a faster boat than the Centurion, it would seem to me, from the standpoint of an observer not interested in either of the boats, that the statement of Capt. Hutchinson is much nearer correct than that of Mr. Gaskin. H. E. Schmuck.

Springfield, Mass., Oct. 30, 1896.

No Vessel Lost.

Editor Marine Review:—The report with reference to the loss of the schooner Sand Hill is entirely unfounded. I was unaware of the report until my attention was directed to it by the branch hydrographic office of Cleveland. E. Dunn, Commander,

Dominion Gov't. Stmr. Petrel.

Amherstburg, Ont., Nov. 3, 1896.

To California on the Nickel Plate road—Our service, time, and rates are not excelled. Our fast western express makes direct connections with the California limited from Chicago every day; also our night express due at Chicago at 7:40 a. m., daily. All details cheerfully explained by agents at depots, or Cleveland city ticket office, 224 Bank street, 379-Nov. 20

Unprecedented Demand for New Ships.

It seldom happens that the grain movement from Duluth and Chicago on the lakes to the seaboard is hampered on account of the inability of exporters at New York and other eastern points to find vessels in which to move this class of freight, but such is actually the case, just now, and the present situation as regards ocean freights is not fully understood on this side. The reports from the Clyde and from the ship building districts of England are to the effect that the advance in freights of all kinds is phenominal. Some of the ship builders are reported to have enough work on hand to last them a couple of years. This is due in some cases to orders for war vessels, which have been quite liberal of late, but the advance in freights has been such as to crowd contracts for new merchant vessels onto the ship builders all in a heap, rather upsetting things, as owners are crying for early delivery.

"The extent of business now in hand," says Fairplay of London, "has been unprecedented in recent years. The present rates of freight will enable even compound vessels to make a profit, while it is expected that new boats will give a handsome return. Owners who, a short time ago, were bewailing their fate in having old boats on their hands for which they could get only a breaking-up price, are now much elated as they can obtain at least 25 per cent. more for their vessels than they could two months ago. All the new boats on the stocks approaching completion that were not sold on the appearance of the rise were at once snatched up. Some builders, thinking that freights would soon decline, have filled up their order-books, while others are holding their hands so as to come in later on, when freights as they anticipate will be still higher, at top prices. In consequence of the increased demand for new steamers prices have, as was to be expected, gone up, over 10 per cent. more being now asked than a month or so ago. The vessels which have been contracted for are of the better class of cargo-boat, while the majority of the vessels contracted for in the first half of the year were either for lines or foreign owners."

Stocks of Grain at Lake Ports.

The following table, prepared from reports of the Chicago board of trade, shows the stocks of wheat and corn in store in regular elevators at the principal points of accumulation on the lakes, Oct. 31, 1896:

	Wheat, bushels.	Corn, bushels.
Chicago	15,224,000	7,540,000
Duluth	5,670,000	80,000
Milwaukee	521,000	65,000
Detroit	463,000	39,000
Toledo	553,000	56,000
Buffalo	2,053,000	1,523,000
Total	24,484,000	9,303,000

As compared with a week ago, the above figures show, at the several points, named a decrease of 51,000 bushels of wheat and an increase of 344,000 bushels of corn.

A Cleveland vessel owner who has made a large collection of artistic photographs called at the office of the Marine Review, and after looking over the photographs which our photographer obtained recently in the Detroit river near Bois Blanc island, he bought eight of them. Any one making a collection of marine photographs can not afford to ignore this lot of pictures—print size 11 by 14 and paper size 14 by 17 inches. If several prints are desired for examination they will be forwarded to any address on the understanding that return express charges will be paid if they are not satisfactory. No one will make a mistake, however, in ordering the panoramic view of Bois Blanc island, the Lime-Kilns and Amherstburg, which is 11 by 28 inches—$3 mounted, $2.50 unmounted, $5 with a matt and frame, or $6 mounted on a handsomely finished oak board. Another view 11 by 14 inches showing Bar point light and some sixteen vsesels between the point and Bois Blanc island, the whole picture giving a grand idea of the volume of lake commerce, will no doubt have a large sale. The Tuscarora and Centurion are leading the up-bound fleet in this picture. The price is $1.50. Among other prints the Schuylkill, Sir Henry Bessemer, S. S. Curry, Thos. Cranage, Italia, Frank E. Kirby, Masaba, J. J. McWilliams, Maricopa, I. W. Nicholas, Northern Light, Scranton, Tuscarora, L. C. Waldo, Yale and Zenith City may be said to be the most artistic. The price for single prints is $1.50; when more than three are ordered, $1.25.

Lights, Buoys, Obstructions, Etc.

Buoys of the tenth light-house district will be taken up and replaced with winter buoys on or about the following dates: Those at Dunkirk, about Nov. 10; at Erie, including gas buoy, Nov. 18; Sandusky and island buoys, Nov. 20; Maumee bay, including gas buoy, Nov. 22; Detroit river, Dec. 1. The light-vessels at Ballard reef, Lime-Kiln crossing and Bar point will be left in position as late as circumstances will permit, probably between Dec. 5 and 10. The position of the latter vessel will be marked by a black buoy. Waverly shoal buoy and the buoys in Niagara river will be kept in position as late as the season will allow.

Iron buoys in the ninth light-house district will be taken up for the winter and replaced by spar buoys similarly painted, as follows: Green Bay city to DePere, Wis., Nov. 15; Sturgeon Bay, Wis., Nov. 20; Green bay, Wisconsin and Michigan, Nov. 21 and 22; channels between Lake Michigan and Green bay, Wisconsin and Michigan, Nov. 23; Fox island shoal , Michigan, Nov. 24; Mackinac straits (west of Old Mackinac light-station), and channels north and east of Beaver island group, Michigan, Nov. 25 and 26; off Sheboygan, Wis., Nov. 27; off Milwaukee and Racine, Wis., Nov. 28; off Chicago, Ill., Nov. 30.

The new Canadian gas buoys in Pelee passage, Lake Erie, will be removed on or about Nov. 20, or earlier if ice threatens. This is done partly on account of insufficient arrangements as yet for recharging these buoys and also on account of their value and difficulty in handling them. Captains now have courses pretty well defined for this vicinity and it is hoped that the early removal of the buoys will not be much of a disadvantage to them.

Capt. Charles Christy of the steamer China adds another note of commendation to many similar expressions from vessel masters on account of the gas buoys in Pelee passage. He says the buoys are certainly the best of the late aids to navigation. The lights can be seen fully seven miles in clear weather and they give navigators confidence in entering the passage when lights on the point or island can not be seen in thick or smoky weather.

Another dangerous shoal spot has been found by the Menominee line steamer Saxon. The Saxon was drawing only 16 feet when she struck, a few days ago, about a mile and a half below Detroit river light directly on the course to Colchester. The captain of the Saxon says that two steamers, one on either side of him, were passing up when he struck. The Cambria, another of the steel vessels, fetched up in about the same place a year ago.

About Nov. 16, the fixed red lantern light, shown from the outer end of the elevated conduit on the north pier at the entrance to St. Joseph harbor, Lake Michigan, will be discontinued, and on the same date the tower from which the fifth-order fixed red light is shown at this station will be moved about 290 feet nearer the outer end of the pier and the light reestablished therein as heretofore.

About Nov. 4, the tower from which the fixed red light on the outer end of the old east pier, Cleveland hardor, is shown will be moved to the new east pier. The tower will stand 31 feet from the outer end of the new pier and 121 feet nearer the shore than formerly.

Pine River Winter Moorings.

Editor Marine Review:—Replying to the inquiries of S. E. H. in your number of Oct. 29, in reference to the width of the draw of Front street bridge, I can inform the gentleman that I have measured the same, and find 50 feet in the clear. I can also state that the river above the bridge for over three-quarters of a mile has been dredged 100 feet in width and the banks are almost perpendicular, which is a great advantage to a ship during the ebb and flow of the spring water and sunken ice.

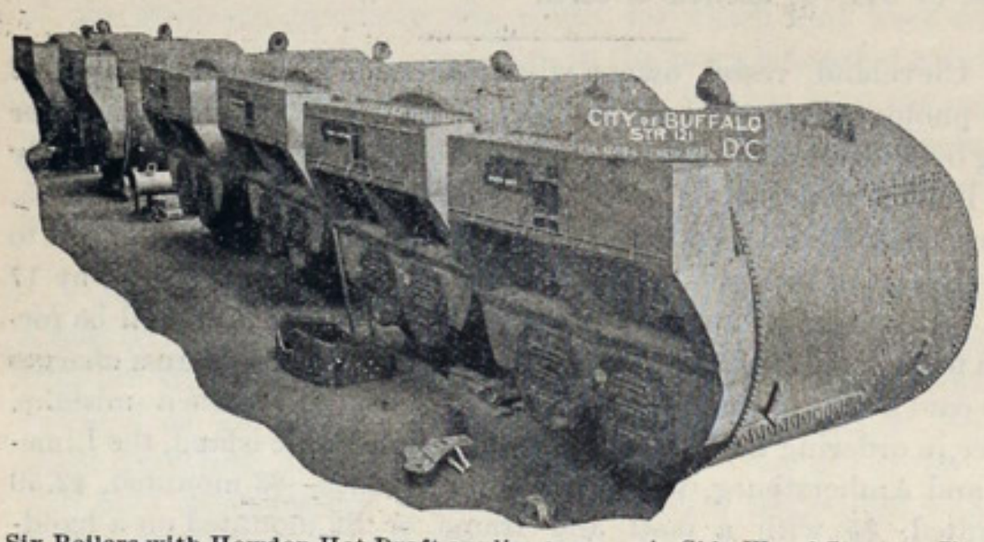
G. H. Couvrette.

St. Clair, Mich., Nov. 3, 1896.

The total valuation of 15,957,614 long tons of iron ore produced in the United States in 1895, as reported by the various mines to the United States Geological Survey, was $18,219,684, giving an average value at the mine of $1.14. Michigan's product was valued at $8,403,958, Minnesota's at $2,803,452, and Wisconsin's at $633,165, or a total valuation at mines of $11,840,575 for ore produced in the Lake Superior region. Up to 1885 a list of twenty mines would have included all mines in the country which had in any one year reached or approximated an output of 100,000 tons, while in 1895 forty-four mines exceeded this amount, and of these forty-four all but seven were in the Lake Superior region.

Air is Cheap—Cheaper than Dirt!

FUEL IS DEAR—VERY DEAR!
USE AIR AND SAVE FUEL!



Six Boilers with Howden Hot Draft appliances now in Side-Weeel Steamer City of Buffalo. Dimensions of each boiler—12 ft. 6 in. diameter by 12 ft. length.

ECONOMY in operating expenses on Lake Ships must come from reduced coal bills. No great saving can be made in labor cost, and provisions are already low. But fuel bills can be lowered and cheap coal used to advantage by adopting Modern Methods of making steam at low cost.

No manufacturer of pig iron would to-day think of running his furnace without a hot blast. Competition would not permit it. This same competition demands advanced practice in the operation of ships. The same principle is applied in the

HOWDEN HOT DRAFT

Now in use on Lake Steamers aggregating over 40,000 Horse Power.

CAN BE APPLIED TO OLD SHIPS AS WELL AS NEW ONES.

No complicated machinery. Cool engine rooms and cool fire holds. Estimates readily furnished for application of this draft to any steame

DRY DOCK ENGINE WORKS, DETROIT, MICH.

IF YOU HAVE MONEY TO BURN

You can burn it in the boilers of your steamers without knowing it until the fuel bills come in. If not you will be interested in

AN INVESTMENT THAT PAYS 20 PER CENT.

Take all your fuel bills for the season and add up the amounts. If you have a modern steamer divide the total by 5, and the result will be

THE AMOUNT OF MONEY YOU "BURNED" THIS SEASON,

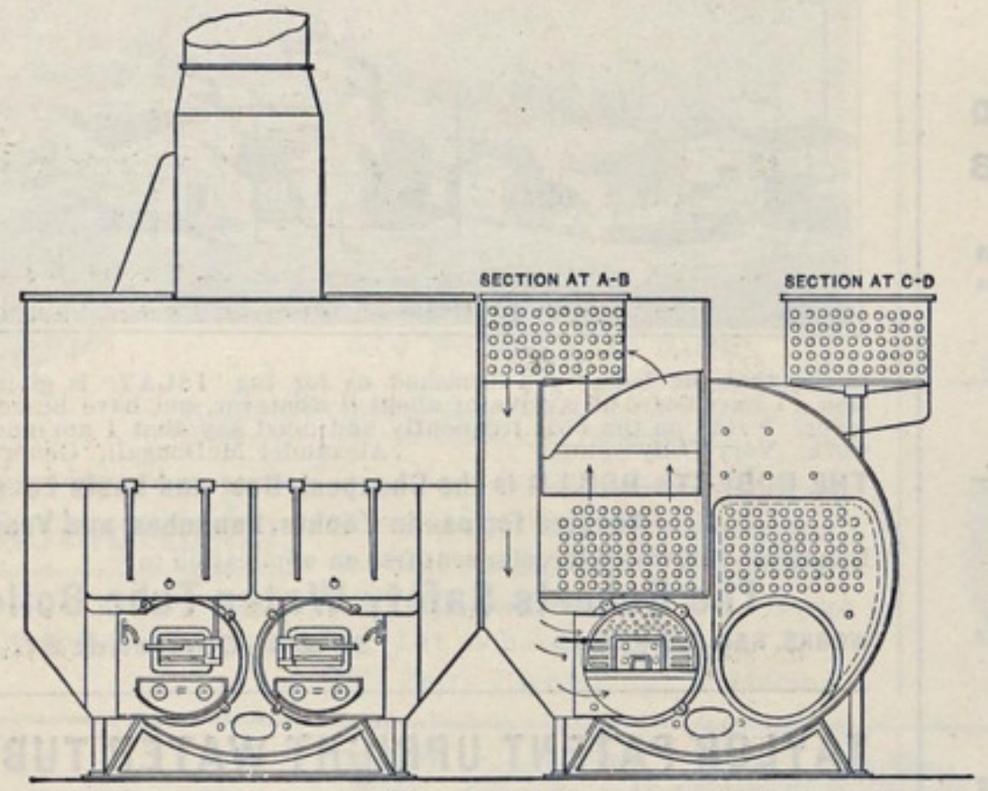
And the amount you can save next season by having your steamer equipped with the

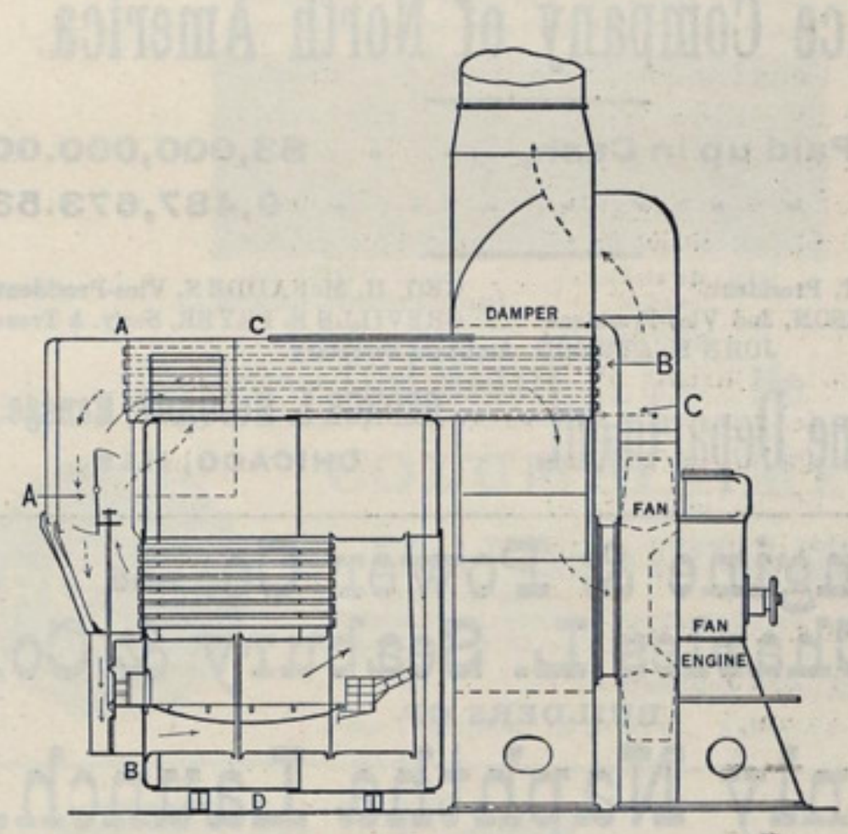
ELLIS & EAVES SYSTEM OF DRAFT.

If you are interested in reducing the fuel consumption of your steamer to the lowest possible point, divide the total of the season's fuel bills by 3, and after looking at the result figure how much you can afford to pay to have your boilers retubed with

SERVE RIBBED TUBES

In addition to having the Ellis & Eaves system of draft. **The draft will save 20 per cent. of the fuel and the tubes from 10 to 15 per cent. additional.**



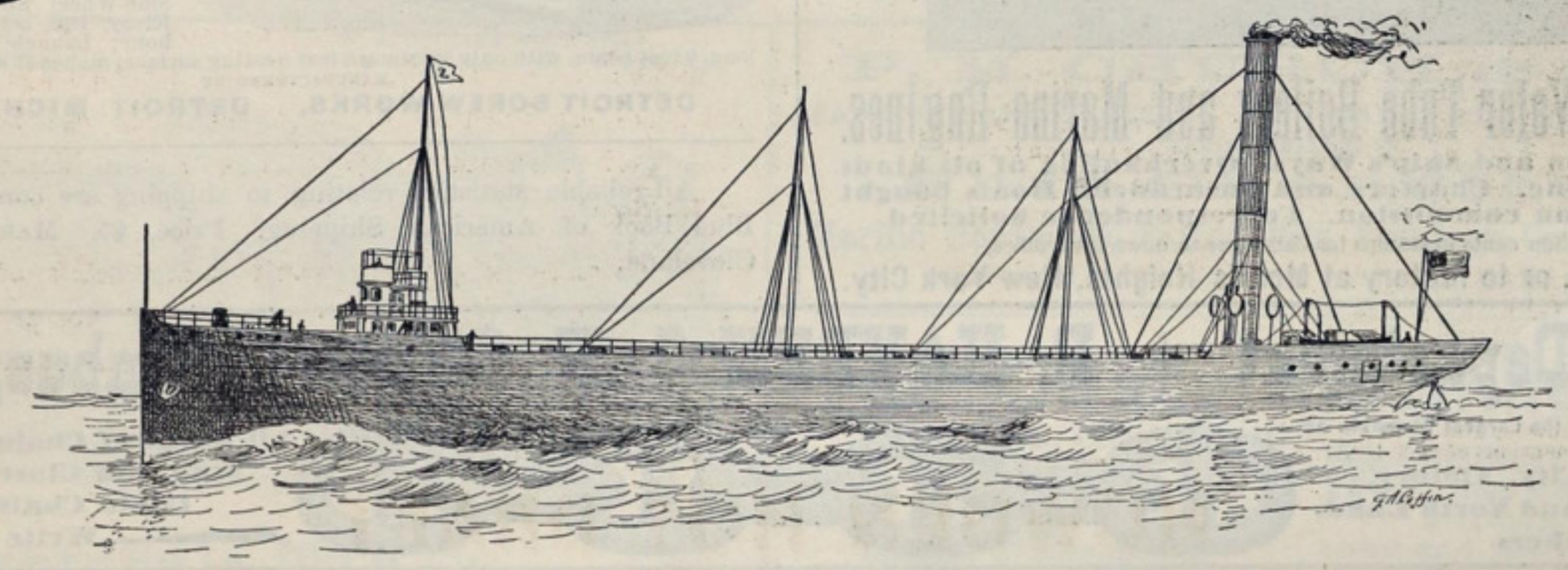


IF YOU ARE SKEPTICAL

You can refer to a table on pages 196–97 BLUE BOOK OF AMERICAN SHIPPING, which gives the coal consumption of ten modern lake steamers an average of **2.22** pounds per horse power per hour.

THE TEST OF THE STEAMER L. C. WALDO,

See MARINE REVIEW Oct. 22, fitted with the ELLIS & EAVES DRAFT, shows a consumption of **1.79** pounds—a saving of **20** per cent. with plain tubes With SERVE TUBES and subtracting for auxiliary machinery, this can be reduced to **1.5** pounds, a saving of 33⅓ per cent. The simplicity of this system of draft and the construction of the tubes will commend themselves to the most practical ship owners, builders and engineers, when it is known that it consists merely in making the natural draft stronger—not forcing but inducing it.



STACKS 200 OR 300 FEET HIGH.

Would give somewhat similar results. The SERVE TUBE is even more simple. SEE THOSE RIBS—they present 70 per cent. more heating surface than plain tubes. Smoke is unconsumed carbon, the essence of the coal. Watch the smoke stack of your steamer.

WHY PAY FOR THE SMOKE WHEN YOU CAN BURN IT? **For full Information and prices write**

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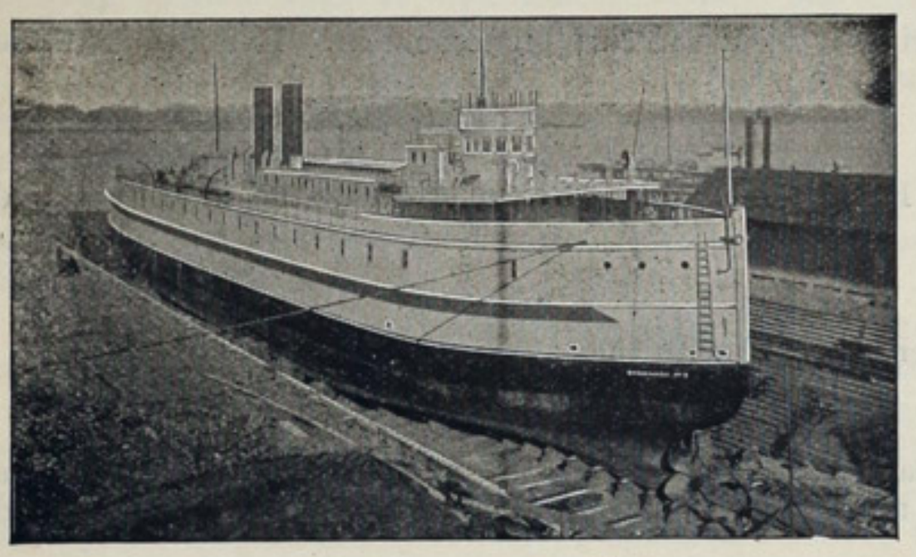
Bertram's Oil Polish. The Marine Polish of the World.

For Brass and all Metal Surfaces it is unequalled. It is cheaper, requires less work and retains it brilliancy longer than any metal polish made. Acknowledged the standard of excellance by the U.S. government in the marine departments. For sale by ship chandlers and engineers supplies stores. BERTRAM OIL POLISH CO., 220 & 22 State St., BOSTON, MASS.



Shenango No. 2, 300 feet long, 54 feet beam.

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TOLEDO, OHIO,

Metal and Wooden Ship Builders.

New Dry Dock—450 feet long, 110 feet wide on top, 55 feet wide on bottom, 16 feet of Water on Sill.

Repairs to Metal and Wooden Ships A Specialty.

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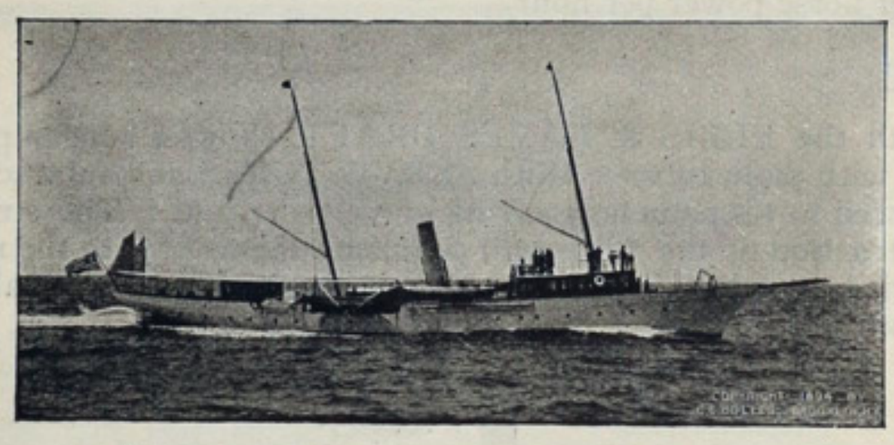
High Class Steam Yachts, Sail Yachts, Electric Launches, Dinghys, Gigs and Yacht Tenders.



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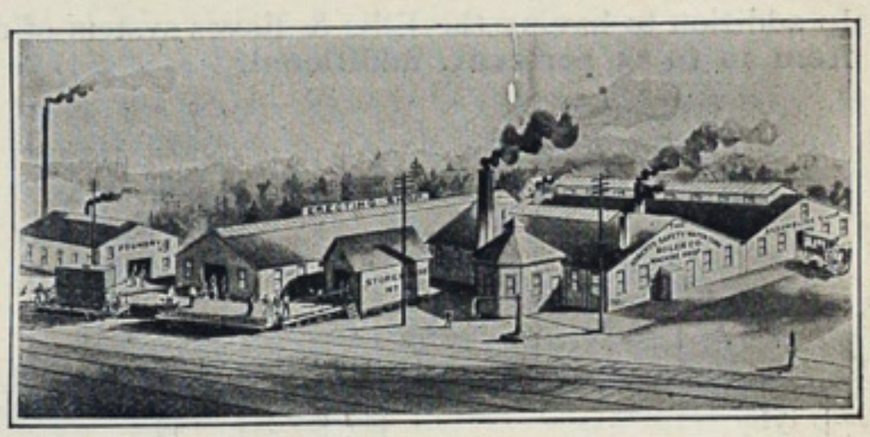

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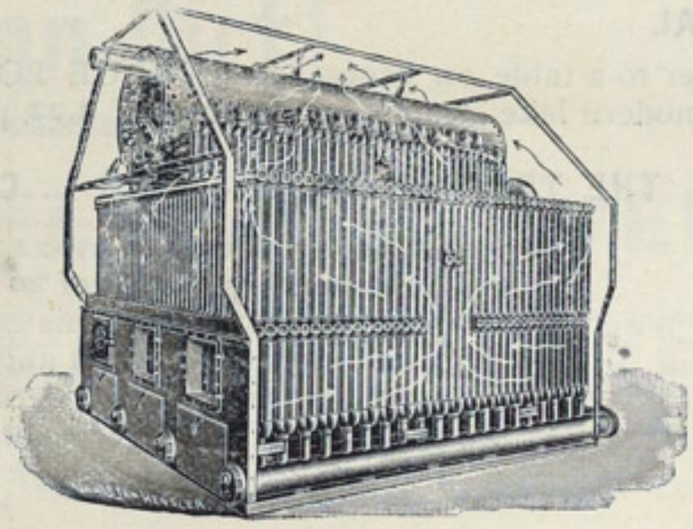

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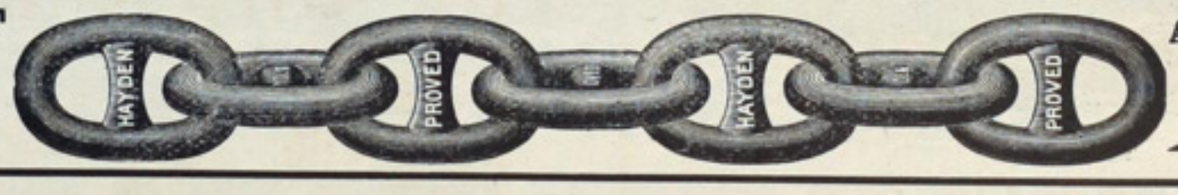

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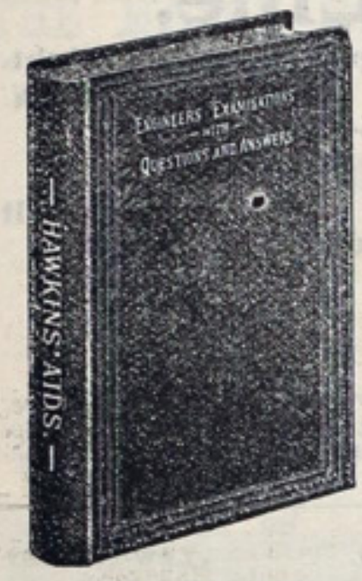

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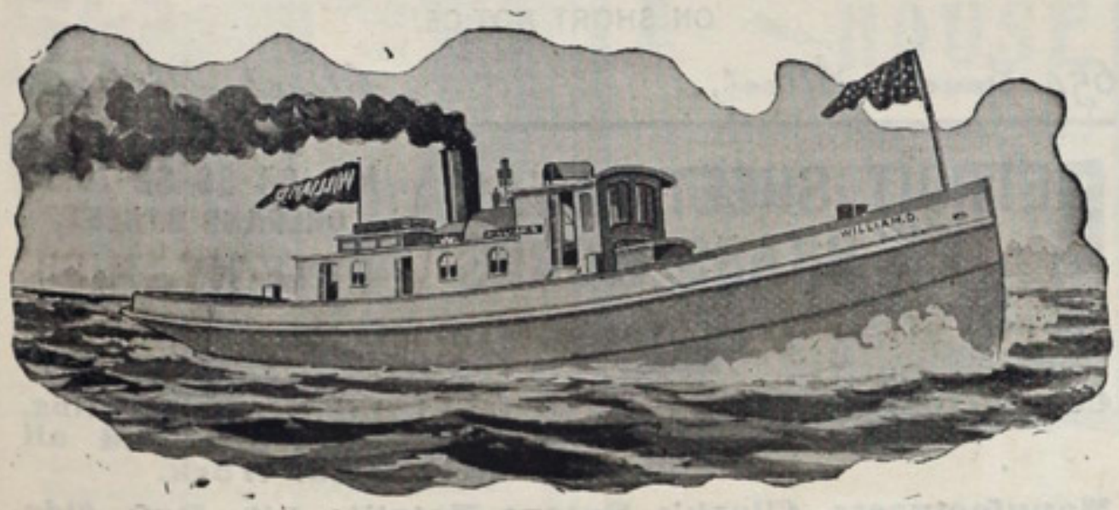

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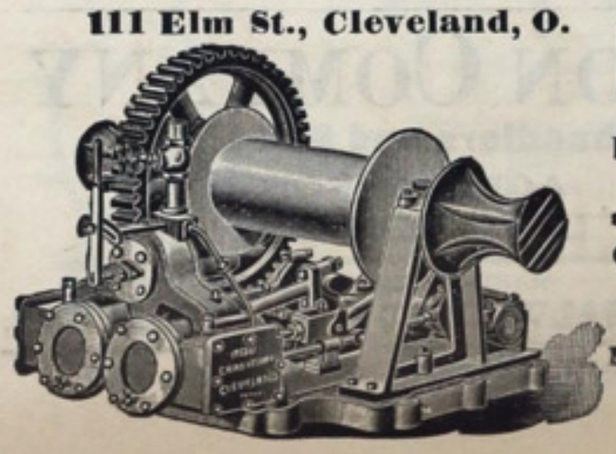

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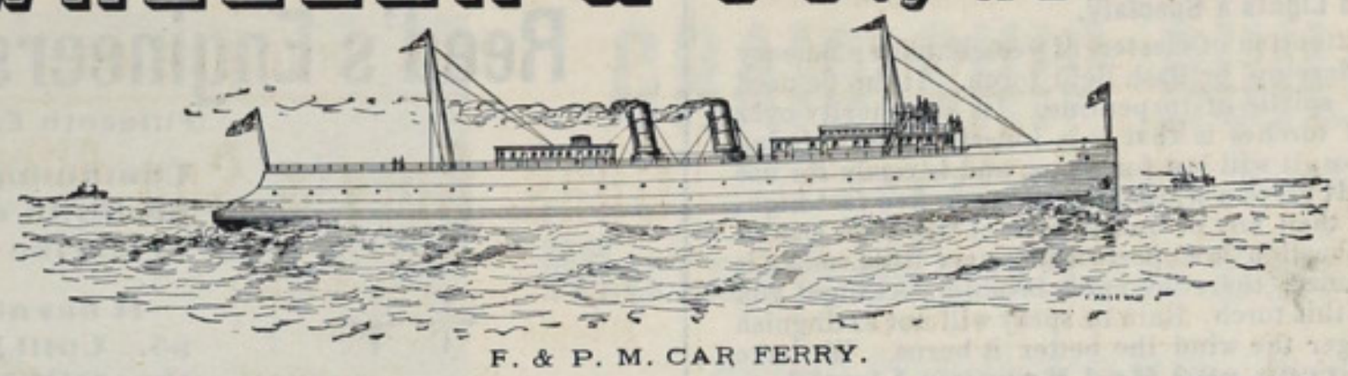

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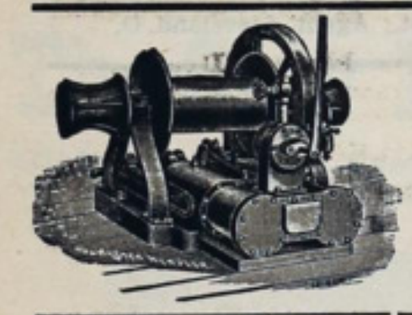

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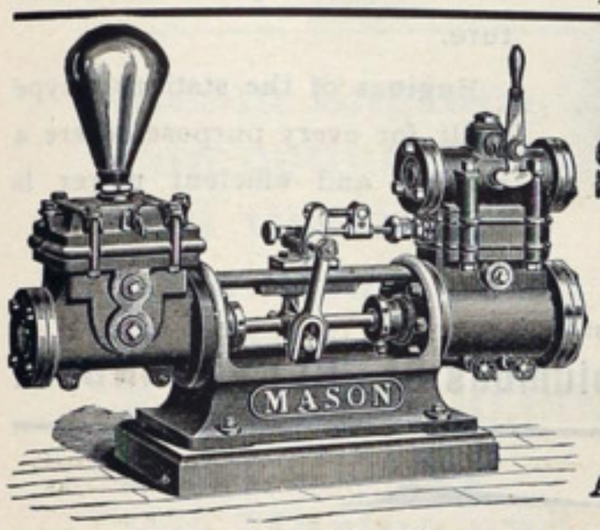

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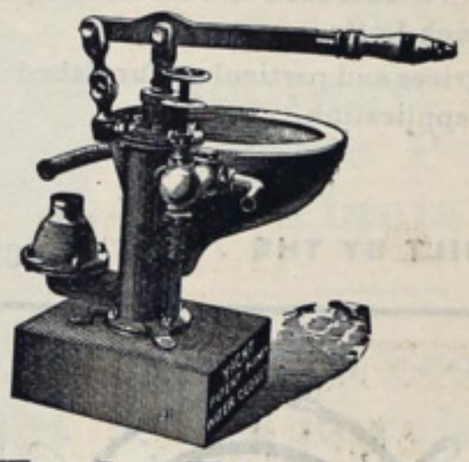

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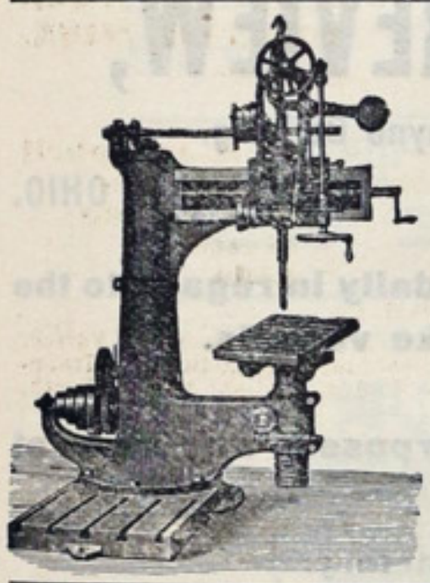

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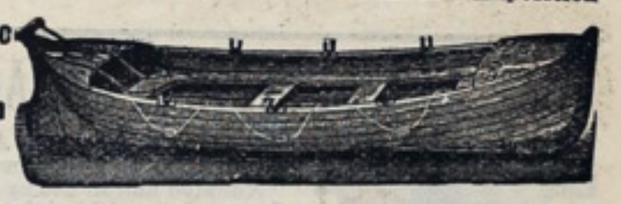

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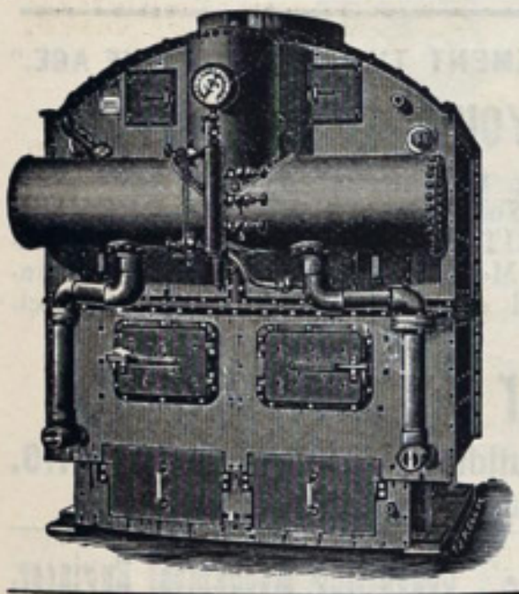

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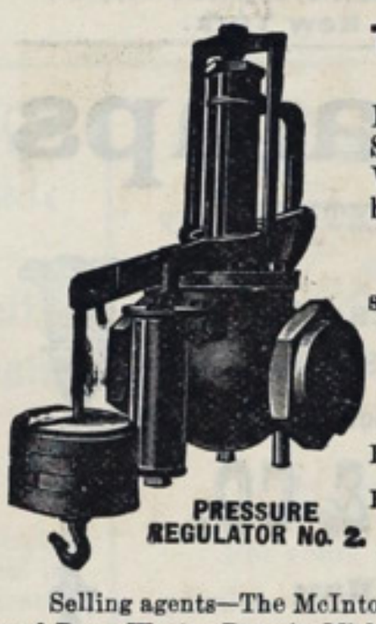

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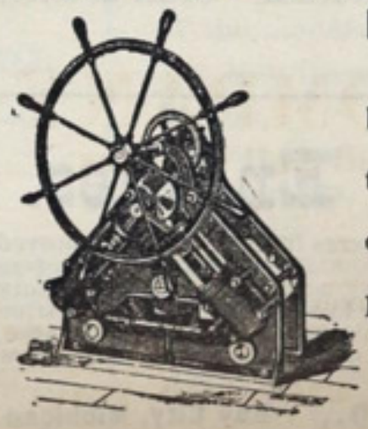

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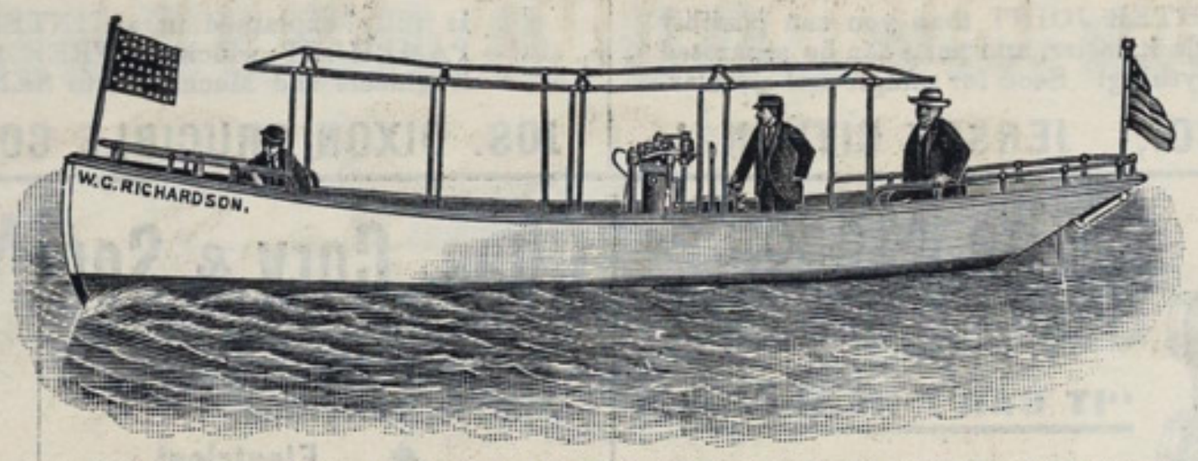

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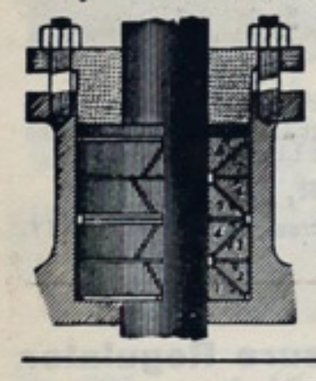

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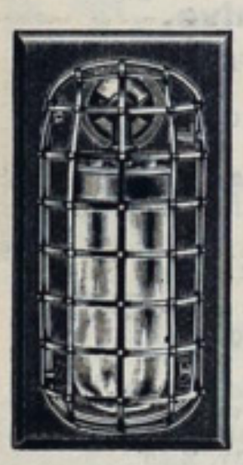

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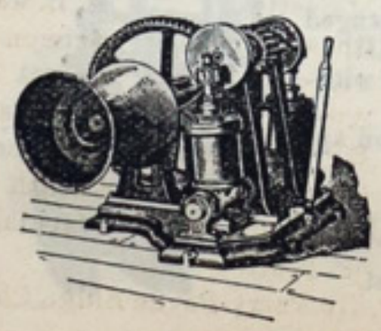

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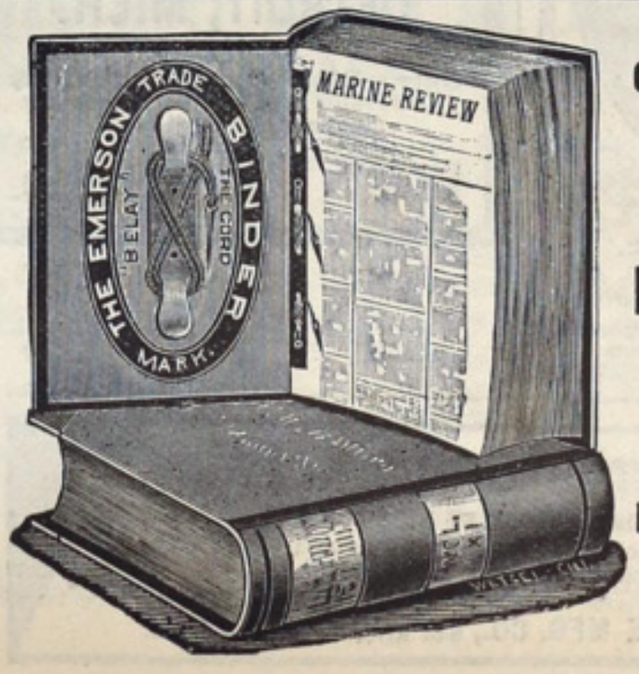

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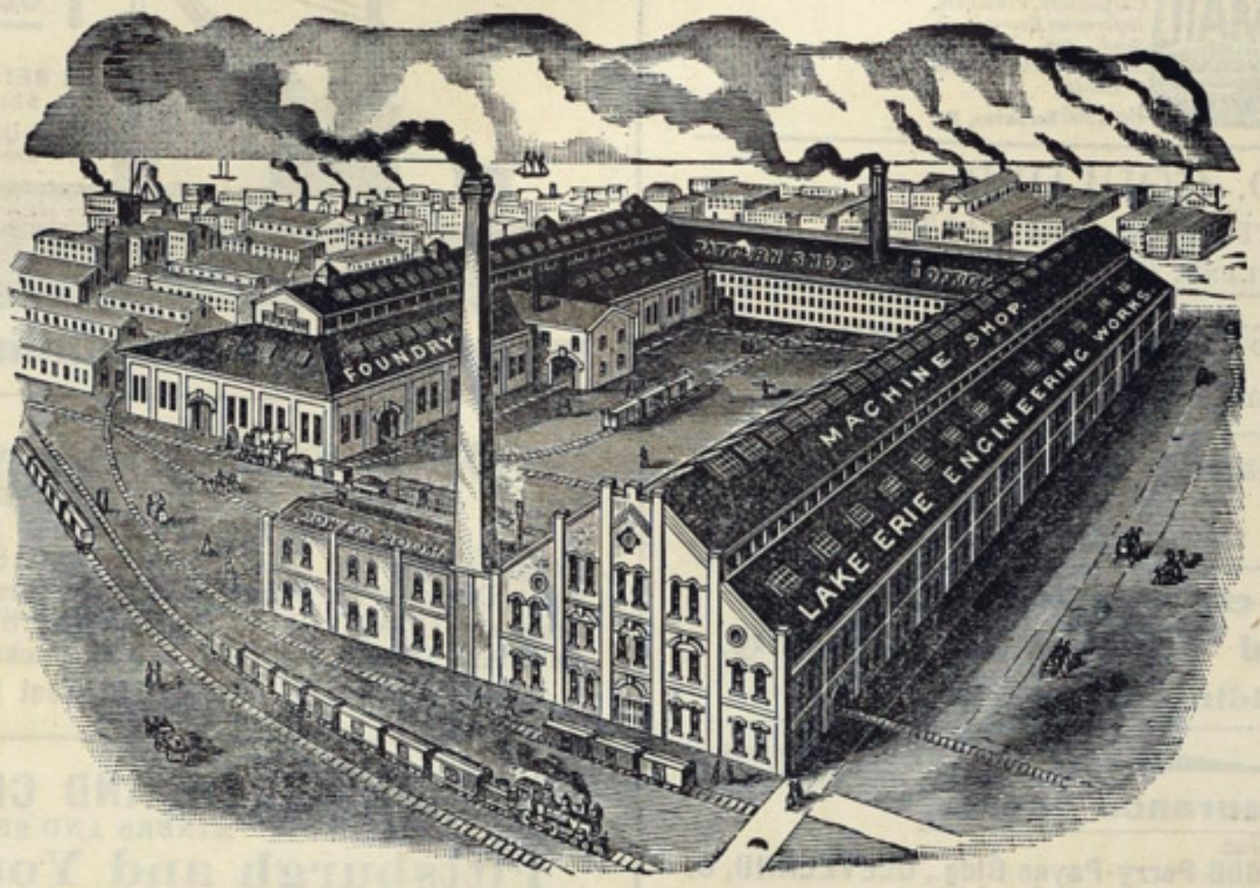

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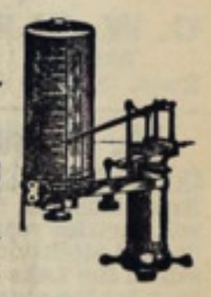

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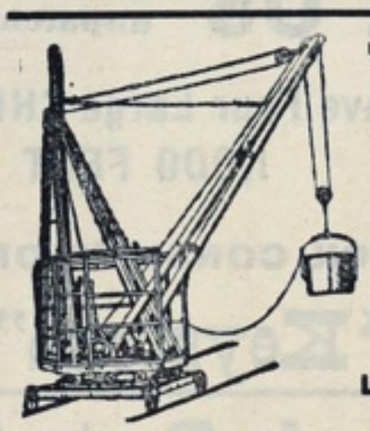

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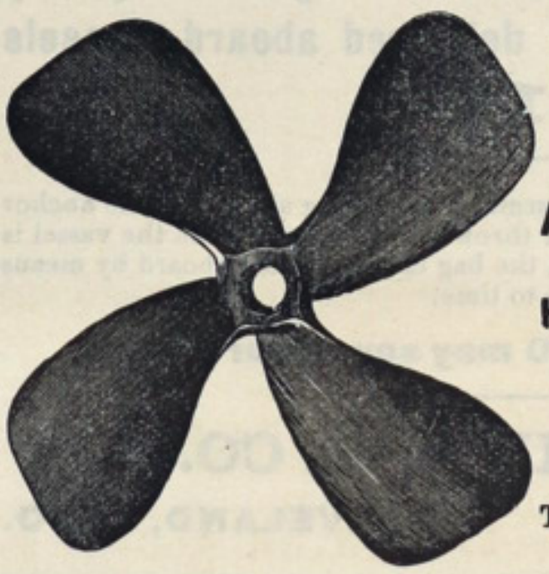

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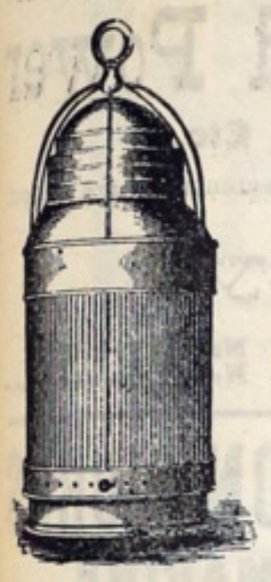

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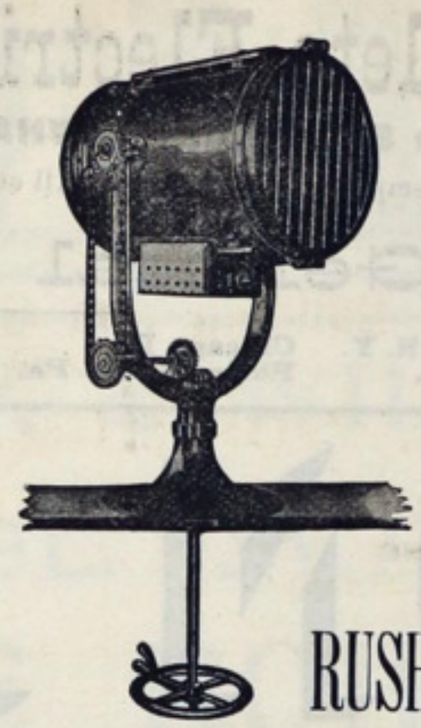

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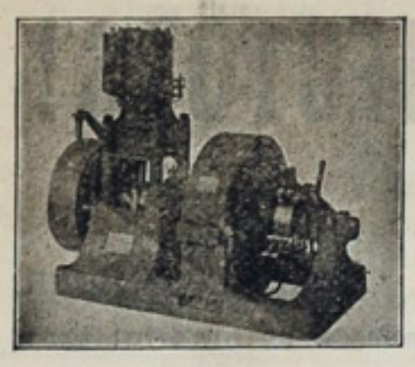

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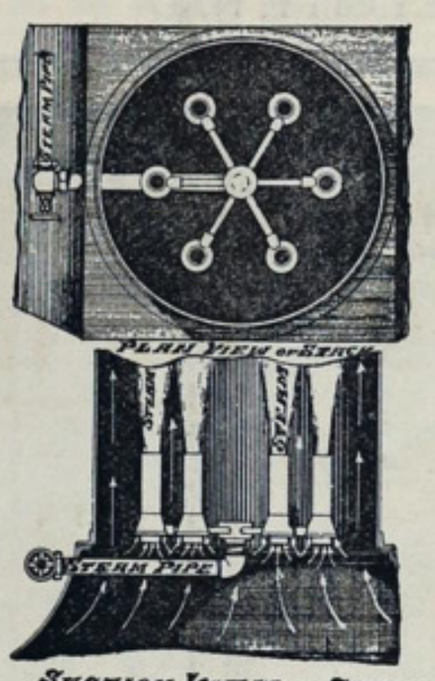

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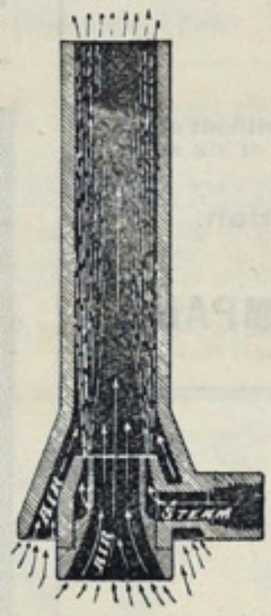

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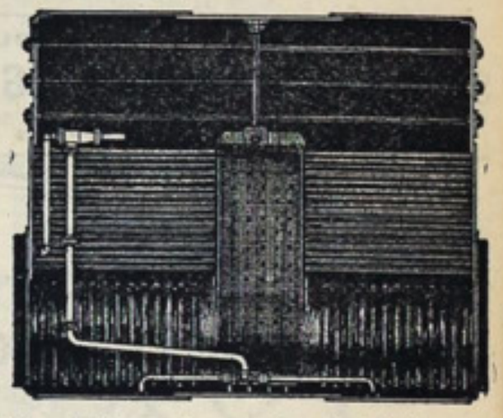

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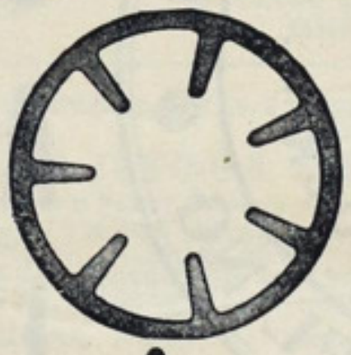

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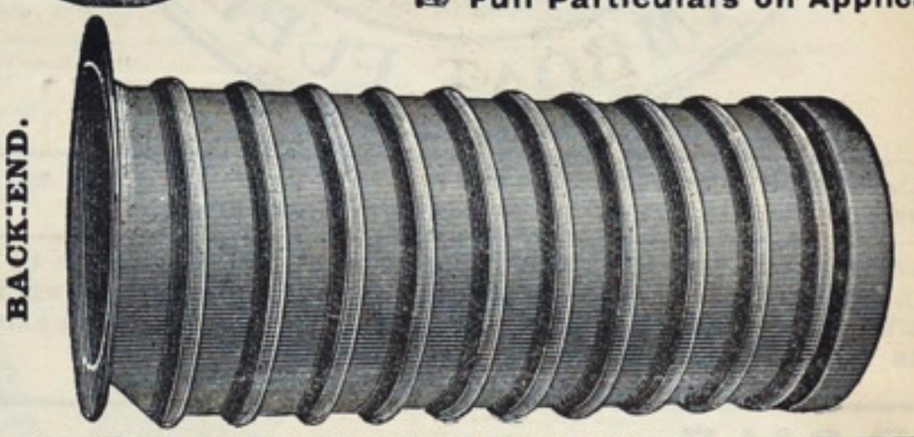

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UNITED STATES ENGINEER OFFICE, 366 Milwaukee St., Milwaukee, Wis., Oct, 27, 1896. Sealed proposals for: Kewaunee Harbor, Wis., 425 feet pile pier extension; Manitowoc Harbor, Wis., 500 feet crib pier extension; South Milwaukee Harbor, Wis, 180 feet pile pier extension; Racine Harbor, Wis., 250 feet crib pier extension; Kenosha Harbor, Wis., 250 feet crib pier extension; will be received here until 12 o'clock noon November 27, 1896, and then publicly opened. Information furnished on application. GEORGE A. ZINN, Capt., Engrs.

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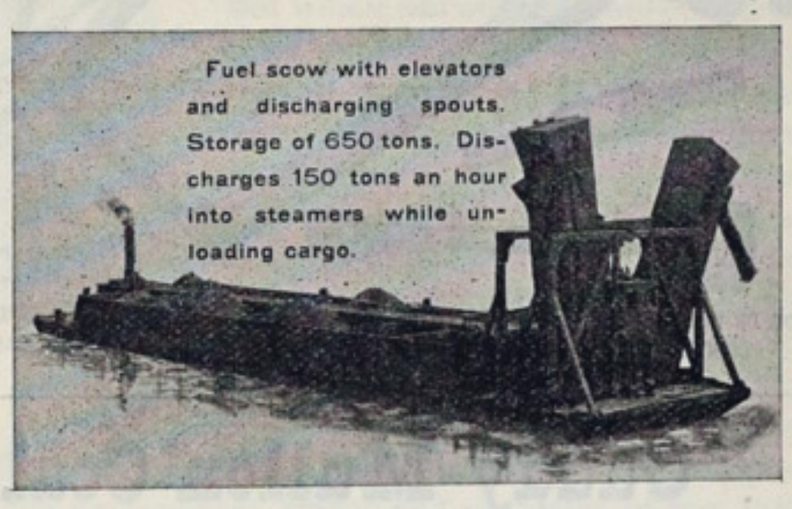
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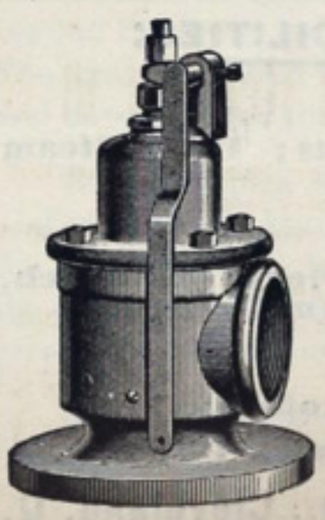

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Lth. on blocks, 340 ft.
Width of gate, 50 ft.
Depth over sill, 20 ft.

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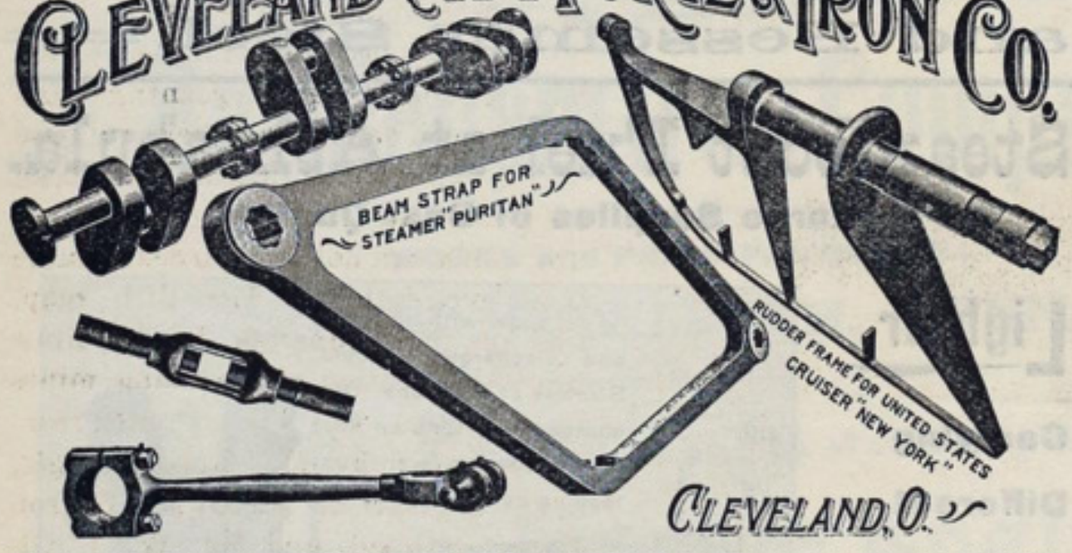

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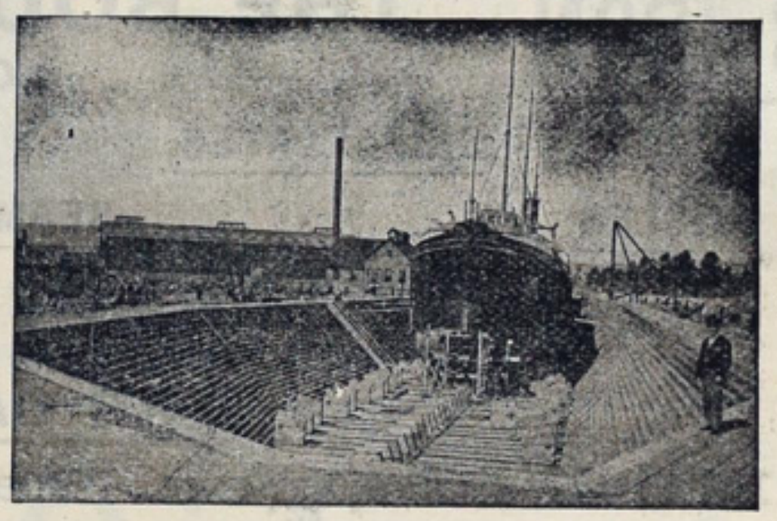

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Breadth, Top	90 " 4 in.	Entrance, Bottom	50 "
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A number of Propellor Wheels in stock at Dry Dock.

U. S. ENGINEER OFFICE, 1101 D. S. Morgan Building, Buffalo, N. Y., October 15, 1896. Sealed proposals for 12,500 feet of Breakwater extension, and for Sand-Catch Pier extension at Buffalo, N. Y., under continuous contract will be received here until 11 A. M. November 30, 1896, and then opened. Specifications and information furnished on application. T. W. SYMONS, Major Engrs. Nov. 25.

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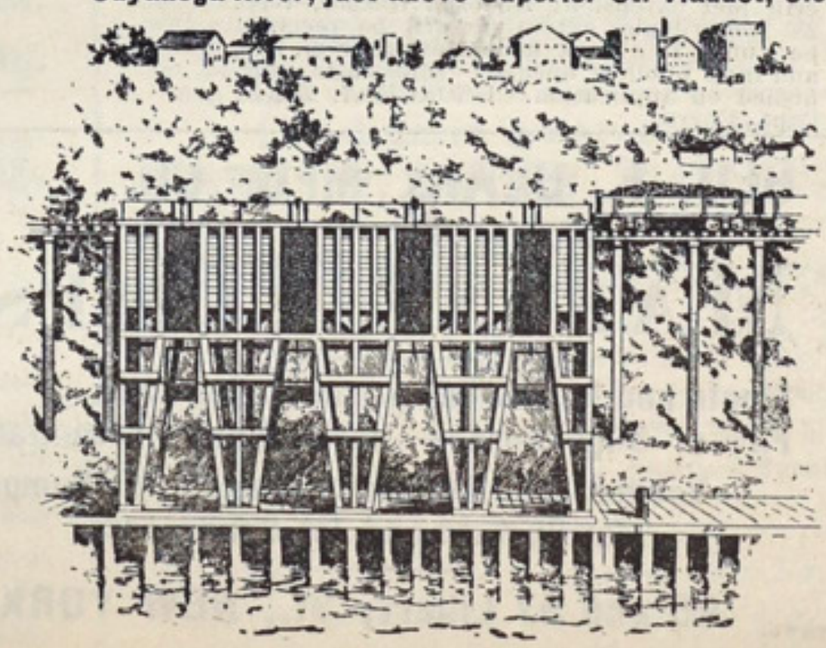
Cuyahoga River, just above Superior St. Viaduct, Cleveland, O.



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